AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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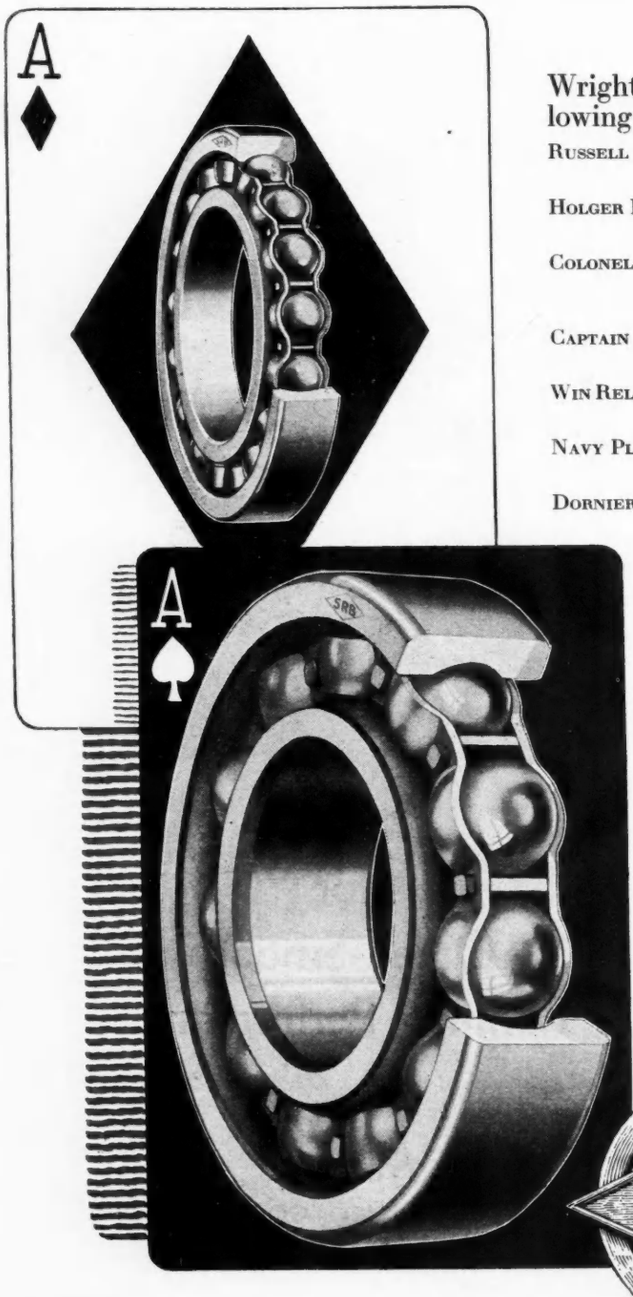
Aviation's "Ace" Accomplishments *in* 1931 *were made with* SRB Ball Bearings



Wright

Wright engines powered all planes responsible for the following achievements of 1931:

RUSSELL BOARDMAN AND JOHN POLANDO establish new long distance, non-stop record . . . New York to Turkey.

HOLGER HOIRRIS AND OTTO HILLIG make trans-Atlantic flight . . . New York to Germany.

COLONEL AND MRS. CHARLES A. LINDBERGH fly from New York City to Tokio, via Canada and Alaska, covering 7,132 miles.

CAPTAIN FRANK M. HAWKS sets 6 new inter-city speed marks between European capitals.

WIN RELIABILITY TOUR—the Cyclone and Whirlwind powered Ford tri-motor scores 10,000 points over nearest competitors.

NAVY PLANES MAKE RECORD. A squadron of 8 Martin "PM" Patrol boats make non-stop, over water flight of 700 miles.

DORNIER DO-X—world's largest airplane powered with 12 Curtiss Geared Conquerers completes 12,000 mile journey.

HAWAIIAN ISLANDS CIRCUMNAVIGATED—a squadron of patrol boats covering the 840 miles in 11 hours and 20 minutes.

3,025 MILE BUSINESS TRIP COMPLETED IN 15 HOURS—Bernarr McFadden, New York publisher, keeps business appointments in 20 cities.

S R B Ball Bearings used in all Wright engines

Lycoming

An outstanding service record

The Century Pacific Air Lines using Stinson Tri-motor planes powered by 3 Lycoming R-680 Engines have completed over 2,430,000 engine miles without any mechanical failures. Similar service records are being established by Century Air Lines (Chicago) and Ludington Lines, Inc.

S R B Ball Bearings used in all Lycoming engines

SRB

BALL

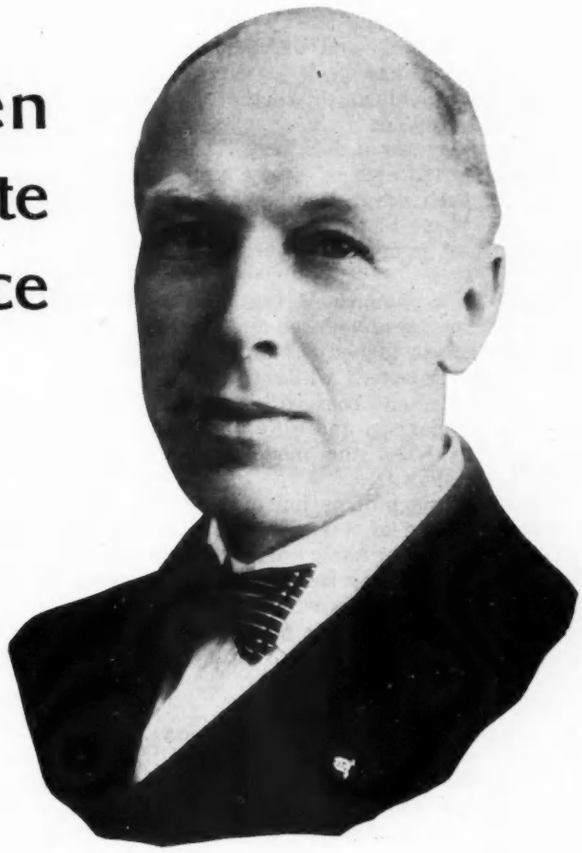
STANDARD STEEL AND BEARINGS INCORPORATED

AUTOMOTIVE INDUSTRIES
VOLUME 66 JANUARY 16, 1932 NUMBER 3

Palace Doors Open Early to Accommodate Big Show Attendance

Early birds find prices of immense consumer-appeal and factory executives show optimistic touch when looking them over

by Norman G. Shidle



Sam Miles . . . watching . . . said: "Open the doors"

"IT'S just 12 minutes to 2, Mr. Miles, it's raining and damp outside and there's a big crowd been milling around out in front for nearly an hour. What do you say we open the doors now instead of waiting until two o'clock?"

Charley Ellias, right-hand man of the veteran show manager, Sam Miles, speaks to his chief who sits on a lounge just inside the doors of the Grand Central Palace, resting a recently wrenched knee and answering final before-opening questions from friends and staff.

"Have they finished that work on the fourth floor yet?" Mr. Miles queries.

"Almost," came the reply. "They'll be finished before the crowd can get that far anyhow."

"All right. Open the doors!"

And so began this 32nd National Automobile Show in New York on Saturday afternoon, Jan. 9, 11 minutes ahead of schedule.

A moment later, eager crowds were swarming up the newly carpeted stairways, hesitating for a moment at the top, then gradually fanning out in all directions to pass first judgment on the 1932 products of the automobile industry.

Every year there is something of a thrill—a tension in the opening of the doors of the great annual automobile show. But this year, one sensed just a little more of drama, a little more of underlying tautness as the great crowd moved forward, then rapidly lost its identity as a crowd to become just hundreds of individuals upon whose individual decisions and judgments is to rest the commercial fate of a great industry during the next 12 months.

All year, in two score factories, engineers, sales executives and manufacturing men had toiled and sweated; argued and fought; and finally decided and created. All morning important executives from nearly every factory had been walking for hours through the Palace floors, arranging and rearranging their own exhibits; inspecting the models of their competitors; getting the last touches ready for the opening of the doors to the public.

And now, 11 minutes ahead of time, the doors were opened. The crowds came in. And Al Reeves and Sam Miles, standing together just off the center aisle, appraised the 1932 throng of potential buyers with eyes of long experience—and chatted amiably the while.

Inside the crowd found the brightest and most cheerfully decorated show in history. Light colors predominated, portending, executives hoped, the long looked for change in the business sky. It found many changes in body design and two or three particularly striking achievements along this line. It found unprecedentedly low prices on a number of cars; prices which made one rub one's eyes in unbelief on more than one occasion—and which must have made manufacturers who had been too conservative in this respect wonder a bit as to whether that conservatism is going to pay or not.

For despite new bodies, new transmissions and new engineering features of every kind, it is the combination of such advances with exceptionally low price that made some of the cars in the show stand out in the minds of many in the crowd above some of the others.

While price changes during show week were relatively few, prices announced for the first time on several new models turned out to be lower than had generally been expected, while the grouping of all the new cars under one roof with price tags attached emphasized comparison and difference to a more marked degree than when the models were separately described and shown.

A distinct touch of optimism pervaded the thinking and conversation of a majority of factory executives in New York as the show opened. While most of them were just as chary as last year about making predictions for publication, we found a better sentiment as regards the outlook for the next six months than might have been expected in the light of the exceptionally low sales totals of recent weeks.

Optimism Tempered by Experience

During the day on which the show opened we talked with such men as C. H. Bliss, of Nash; Neil McDarby, of Auburn; Harry Moock, of Plymouth; Paul Hoffman and Roy Faulkner, of Studebaker; Roy Peed, of DeSoto; Rufus Cole, of Hupmobile; George Graham, of Rockne; John Williams, of Franklin, and others.

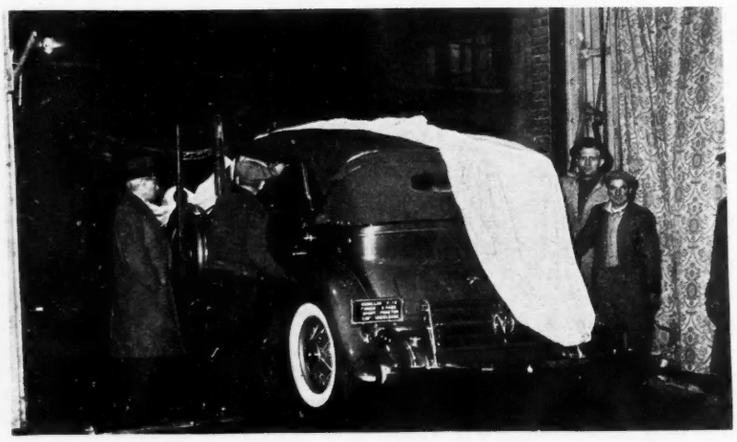
And the optimism which we found was well tempered by knowledge of existing conditions. It was based partly on the idea that enough cars have been worn out by now to insure some upturn and partly on the thought that definitely new models at lower prices were bound to attract additional buyers.

It is almost certain, however, that the first quarter of 1932 will run behind the first quarter of 1931, due as much to the caution of manufacturers about putting their new models into production quickly as to lack of actual sales possibilities. The new DeSoto, for example, which attracted a great deal of attention both from the trade and the public, will not be in production in any quantities before February. The smaller of the two Rockne lines will get into real production about the same time, the new Packard lines will be running full blast in March and April, while several other lines, some of which are due for later announcement, will begin to swell production and sales totals only when the spring selling season has actually begun to get under way.

Incidentally, little talk about holding all new model announcements until automobile show time is being heard this year. It is already certain that at least two important new model announcements both of which give promise of being very striking, will be made within the next two or three months, while other changes in existing lines are definitely contemplated around the middle of the year.

There is every indication, in other words, that 1932 is going to be a year in which competition and activity will be vigorous and moving from beginning to end. Every maker will have to be on his toes throughout the year. Changes in product, in merchandising methods and in dealer policies will continue to come with regularity as the months go on. Never before did the atmosphere and the developments of New York Show week point to a less static outlook for the industry. With the opening of the big National Show this year the industry has reached a new high point in product, in value per dollar and in readiness to market its products in a powerful and efficient way. Yet, at the same time, its thinking is very fluid. It is entering a period of movement which will be more constant and more widespread in every phase of its activity than ever before. Everything is set—and yet nothing is set!

McAneeny congratulates first buyer



Cadillac moves in

JUST AMONG OURSELVES

New York Show Strikes New Tone

MORE action in show exhibits this year than ever before, so long as we can remember. Studebaker has a lecturer whose talk about free wheeling and kindred subjects is emphasized by four beautiful girls, two of them on bicycles. Hudson has an instrument panel, surmounted by a glass case in which are shown the instruments themselves which usually are concealed beneath the panel. You can push and pull the various stops and watch things happen in the glass case. DeSoto has a model of its factory in which actual production processes seem to be going on; is said to have cost $25,000, and two of them are reported to have been built. Cadillac has a beautiful lady chassis demonstrator—and that's all we can remember at the moment. As is evident from the above, stripped chassis were more numerous and more attractive than in the past.

Some Real Engineering

THE truck division of the show began to produce more and more activity as the show wore one. On the opening day a number of truck executives were present, many of them from companies which were not exhibiting. Some of the non-exhibitors expressed surprise at the size of a few of the models which had been placed on display. We, too, couldn't figure out just how some of the bigger jobs had been gotten up there on to the third floor.

At that, the major engineering achievement of Show Week probably was the lifting of the new Packard models on to the mezzanine floor of the Hotel Roosevelt for display in the main ballroom where the dealer meeting was held. Important Packard executives stayed up most of Friday night supervising the task, we are told.

Trading Allowances Are Discussed

ARGUMENTS about the virtues of trading allowances as compared to price cuts continue at both formal and informal gatherings of trade and factory men. R. H. Grant at pre-show salesmen's dinner vehemently opposed trading allowances under any and all circumstances. Mr. Grant's pretty often right about practical merchandising matters.

Low Price Groups Overconfident

SOMEBODY in the low-priced field is going to be disappointed with their volume in 1932, we are afraid, after talking with executives of most of the cars in this price group; that is unless the total volume for the group goes up much faster than anybody expects. Nobody wanted to be quoted, but when we added up the confidential estimates we found that one of three things had to happen: either total volume in the low-priced group has to be several hundred thousand more than any individual executive expects; or Chevrolet and Ford are going to lose a lot of business that neither expects to lose; or somebody else is going to be disappointed. And it's just that courage to fight for leadership, indicated in the estimates given, that makes this automobile business an exciting and a fine business in which to be. May the best man win!

A Bit of Reminiscence

"THIS isn't the way I used to do shows." Sam Miles struck a reminiscent vein as he sat in a newly cushioned little lounge near the main entrance stairway to the Grand Central Palace waiting to give the word to open the doors for his 32nd New York show last week.

"Why, in the old days, instead of sitting here, I'd have been down there by the gate answering questions, seeing to this detail and that, and doing everything in the place except sell tickets—and I even sold them to the exhibitors. I used to be my own treasurer and almost my own everything else. We couldn't afford in those days to pay any staff to do things.

"And—well—if this business depression keeps on the way it is, I may be back selling tickets yet!"

Then, chuckling as he did so, he stood up to get a better look at one of the largest opening crowds in history as it rushed up the steps.

Show Rooms vs. Service Station

HAD a most interesting talk last Saturday morning with C. H. Bliss, Nash vice-president. Among other things he voiced the opinion that if a dealer today had to make a choice between having a big showroom or a fine service station, he had better consider the service station at least as important as the showroom. He indicated, too, that Nash encourages its dealers to service all makes of cars when the local conditions are such as to warrant such activity.—N.G.S.

Show Curtain Rises on Larger Engines

Gadgetry rampant on 1932 models as parts makers come into their own with multitude of new ideas packing diversified sales punch

by P. M. Heldt

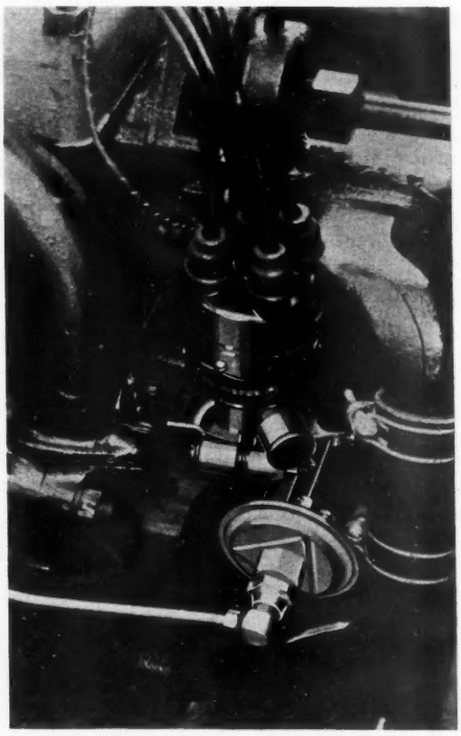
LARGER cars with more powerful engines, greater average number of cylinders and especially an increase in equipment without increase in price, describes in a few words the general trend at the beginning of 1932. There are few striking innovations, but cars in general have been improved in appearance, especially at the front end; they are better streamlined, and such innovations as sloping windshields and the elimination of visors from the outside of closed bodies undoubtedly have reduced the air-resistance coefficient.

That there was to be a rather general excursion into the multi-cylinder field was foreshadowed last year, when two sixteen-cylinder models were exhibited at the national shows, in addition to one twelve. Since then additional twelves have been announced by Lincoln, Auburn, Pierce, Franklin and Packard; one more has been experimentally developed. On the design of twelve-cylinder engines for passenger cars, opinion among engineers seems to be unanimous that the angle between the two cylinder banks should be other than that—60 deg.—which gives an equal sequence of explosions; but angular spacings vary all the way from 45 to 80 deg.

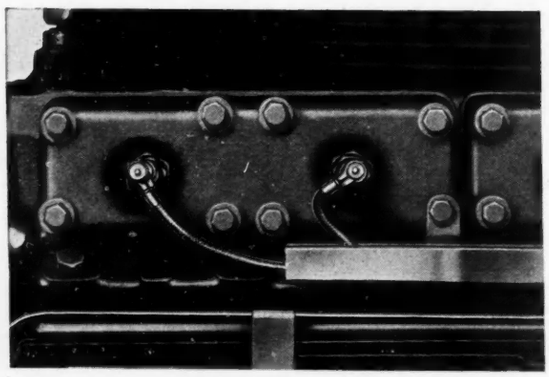
With few exceptions the engine power has been increased over that of corresponding models of last year. In a few cases cylinder bores have been enlarged, as in the Oldsmobile Six, the Chrysler Eight, and both Hupmobiles. Compression ratios have been generally raised, and many manufacturers now offer optional ratios, which are obtained by the simple expedient of using either thin or thick cylinder-head gaskets. In the Packard the standard compression ratio is now 6 to 1, and in the Auburn 12 it is 5.75 to 1. Packard, Cadillac and one or two other makers recommend the use of fuels of high anti-knock rating in their engines with standard compression ratio.

The provision of an automatic decarbonizer by one more manufacturer is an indication that compression ratios in modern passenger car engines leave only a slight margin of safety from detonation.

Maximum engine speeds have been increased in sev-

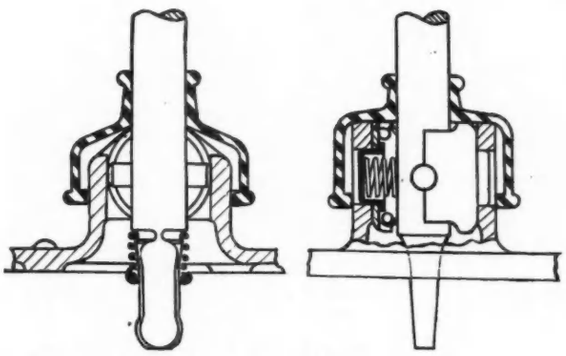


Spark timing by inlet manifold vacuum on Plymouth



Cylinder-head covers on Auburn 12, containing spark-plug bosses

and More Equipment



Chevrolet shift-lever mounting

eral instances by opening up the inlet passages, increasing the valve size, or raising the valve lift. To prevent the occurrence of abnormal bearing loads at these higher speeds, crankshafts are more generally provided with counterweights than heretofore. Such counterweighted crankshafts are found in the new Chevrolet, in the Studebakers, the Chrysler products, Pontiac, Rockne, and the Auburn Twelve. Franklin has increased engine power by connecting the blower cooling system to the carburetor intake, thus slightly supercharging the cylinders.

Aluminum cylinder heads have been adopted by Graham. Since aluminum has greater heat conductivity than cast iron, the light metal in this part prevents formation of hot spots, and makes a higher compression ratio possible.

Bearing Practice

The use of steel-backed main bearings has extended considerably, such bearings having been adopted for new models by Packard, Studebaker and Pontiac, among others. A similar development, that of using rolled-up instead of machined bronze bushings for the piston pin bearing, also has found new adherents. In both cases a smaller wall thickness is made possible, and hence a larger bearing diameter is obtained without increase in inertia or centrifugal force.

Franklin has made a number of improvements designed to increase the life of engine wearing parts. Thus the cylinders are now made of an alloy iron containing both nickel and chromium, and they are also made stiffer by providing them with longitudinal ribs and adding metal at the base flange; and by making the pistons of a low-expansion alloy (which permits of the use of a smaller initial clearance) together with nitrided piston pins. Nitrided piston pins, by the way, also have advantages from the corrosion-resistance standpoint. Case-hardened crankshafts, apparently, are no longer being used by any car manufacturer.

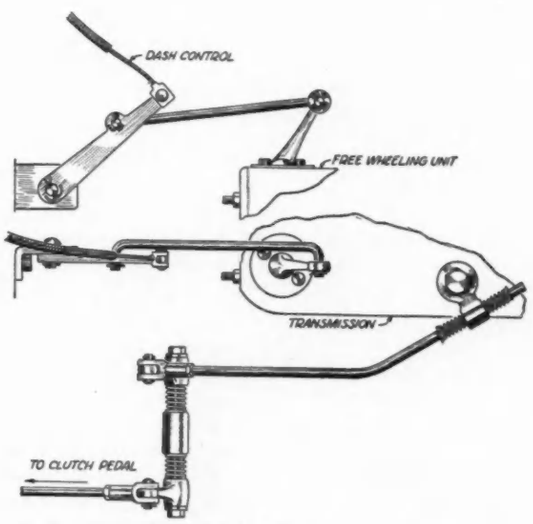
In a good many engines the valve timing has been materially changed, and it is now the common practice to have the exhaust and inlet periods overlap considerably. In former years any changes in valve timing usually had for their object an increase in engine power, but the present move aims more at silencing the engines.

As a matter of fact, the overlap is incidental to the use of very gradual cam ramps, which in some cases lift the valve as little as one-fourth of a thousandth of an inch per degree of cam rotation. Since the valve is lifted so slowly, it must leave the seat earlier; and it closes equally slowly and therefore reaches the seat later. In the Lincoln Twelve the overlap of the inlet and exhaust periods thus amounts to 32 deg. of crankshaft motion. While on the subject of valves and valve gearing it may be pointed out that Franklin, who uses inserted valve seats in an aluminum cylinder head, has changed from aluminum bronze to nickel cast iron for the seats, the latter material being more resistant to ethylized fuel. Chrysler is using valve seats of tungsten steel in cast-iron cylinder blocks to reduce the need for valve tappet adjustment, and this practice of using inserted valve seats bids fair to spread.

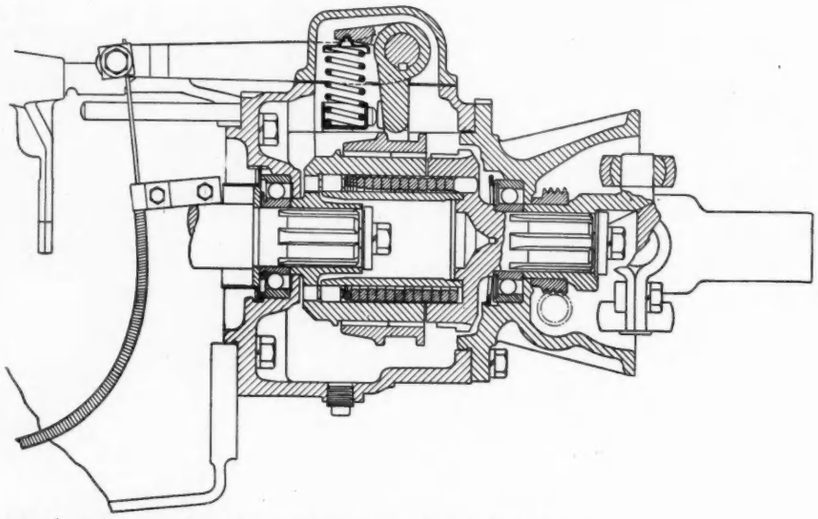
Pistons and Connecting Rods

Where cast-iron pistons are being used it is now the general practice to tin-plate them on the bearing surface. Connecting rods are rifle-drilled for piston-pin lubrication under pressure in several additional engines (Auburn, Pontiac). Pressure lubrication is generally being extended. In the new Chevrolet, main bearings are lubricated under pressure, while in the Packard oil is now carried under pressure to the rollers of the valve rocker arms. Packard is using needle bearings at two points in the valve gear.

A departure in cylinder-head practice is found in the Auburn twelve. There are openings in the cylinder heads through which the valves can be inserted, and these openings are closed by water-cooled covers held on by cap screws. The spark-plug bosses are formed in



Detail of free-wheeling control on Hupmobile



Chevrolet free-wheeling unit of the coil-clutch type

these covers. The removable covers are, of course, an essential feature of the design, since without them the valves could not be introduced, but they also offer an advantage in that they make it unnecessary to remove the cylinder head when the valves are to be ground.

For eight-cylinder in-line engines dual carburetors have gained further ground, evidently because they permit better distribution. Among the models carrying such carburetors for the first time this year are the Buick 50 and the Oldsmobile Eight. Downdraft carburetors also are making headway, being found on the new Auburns, Oldsmobile and Hupmobile.

Precautions against vapor lock are very general in 1932 models and follow for the most part the recommendations made by the Bureau of Standards and other investigators.* That is, the fuel pipe from the rear fuel tank is carried outside the frame channel substantially as far as the dash; under the hood it is kept away from the exhaust pipe as much as possible, and where it has to come close to this pipe it is generally lagged with insulating material, or, alternately, the exhaust pipe itself is lagged. More advantageous locations have been found for the fuel pumps in a number of instances, one location being at the front of the engine, where it is exposed to the blast from the fan. In the Buick the air is taken into the carburetor (more directly into the air cleaner) through a door in the hood, rather than from under the hood, with the result that it will enter the cylinders at a somewhat lower temperature and thereby raise the volumetric efficiency, and another precaution against unnecessary preheating of the air consists in providing a shield between the exhaust manifold and the inlet silencer. The use of mechanical fuel pumps is now almost universal practice.

Induction System Improvements

Intake silencers, introduced only a little over a year ago, have become almost universal equipment. They are generally combined with the air cleaner. One more manufacturer has adopted the automatic choke designed to prevent overchoking, the choke valve being opened by the suction of the engine against the force of a spring. Another type of automatic choke appears. It is opened and closed by a thermostat located close to the carburetor. This device, developed by the Bendix Stromberg Carburetor Co. has found its first regular application on the Oldsmobile. Here the throttle is hooked up with the starter button, so that when the latter is depressed the throttle is automatically moved into the position most advantageous for starting. A decarbonizing device, actuated by a handle on the dash, has found application on one more make of car.

Spark-plug design and spark-plug location are important factors in connection with problems of detonation. At least three makers (Packard, Chrysler and Pontiac) have adopted the new 14 mm. (extra small) plug, undoubtedly to make higher compression ratios practical, and Packard has moved the spark plug to over the exhaust valve, so that the flame in the combustion chamber travels generally from the hotter toward the cooler portion. With the advent of the eight-cylinder engine and the increase in rotative speed came the double-breaker distributor, as it seemed impossible to make a single distributor arm operate sufficiently fast to produce sparks at the rate they were required. Recently this problem seems to have been solved, however, and three manufacturers of eight-cylinder cars (Chrysler, Dodge and Pontiac) have returned to single-arm breakers for eight-cylinder engines.

Ignition Developments

Cadillac now places the ignition coil and relays back of the dashboard, evidently for better protection against atmospheric moisture. One more manufacturer (Studebaker) has adopted the practice of placing the spark-plug timing under the combined control of engine speed and the inlet-manifold vacuum. One effect of this arrangement is to retard the spark more rapidly when the throttle is suddenly closed. In that case the vacuum in the manifold rises suddenly and causes the spark to be retarded; the speed of the engine, of course, also decreases, but more gradually. This method of spark control is said to be particularly adapted for use in connection with free wheeling. Where a free-wheeling device is fitted it is desirable that it should not be possible to close the throttle too far, as there is then considerable danger of stalling the engine, since the car will not keep it turning. The objection to so arranging the throttle that it cannot be closed almost tight is that the engine cannot be idled at so low a speed; this is overcome by the vacuum control of the spark, which retards the spark further than it would be retarded by the governor spring and therefore permits smooth idling even though the throttle is not closed so fully. Detonation while accelerating probably also is reduced by vacuum control of spark timing. This control was offered the industry about a year ago by Delco-Remy and found its first application on the Plymouth announced last summer.

Several manufacturers are fitting larger generators and batteries to compensate for the loss of engine revolutions due to free wheeling, while some merely have

*See "Designers Must Cool Hot Spots in Fuel Lines," by Joseph Geschelin, page 796, *Automotive Industries*, May 23, 1931.

speeded up the generator a little more. Forced cooling of the generator with an air scoop is a Cadillac development.

The new starter control system known as Startix, whereby closing of the ignition circuit and of the starter circuit is combined in one operation—the turning of the ignition key—has found rapid acceptance, having been adopted by Auburn, Hudson, Essex, Pierce-Arrow, Studebaker, Rockne and Franklin. Starter-gear ratios have been increased in at least four makes of engine this year, and while in one or two cases it may have been necessitated by an increase in bore, the principal object undoubtedly is to facilitate cold-weather starting.

Grounding of Engines

With engines now so generally rubber-mounted it has become necessary to specially ground the powerplants to the frame, so that there may be reliable paths for the ignition and starter currents from or to the battery. An elaborate new lighting control has been introduced by Cadillac, which provides for five different operating conditions.

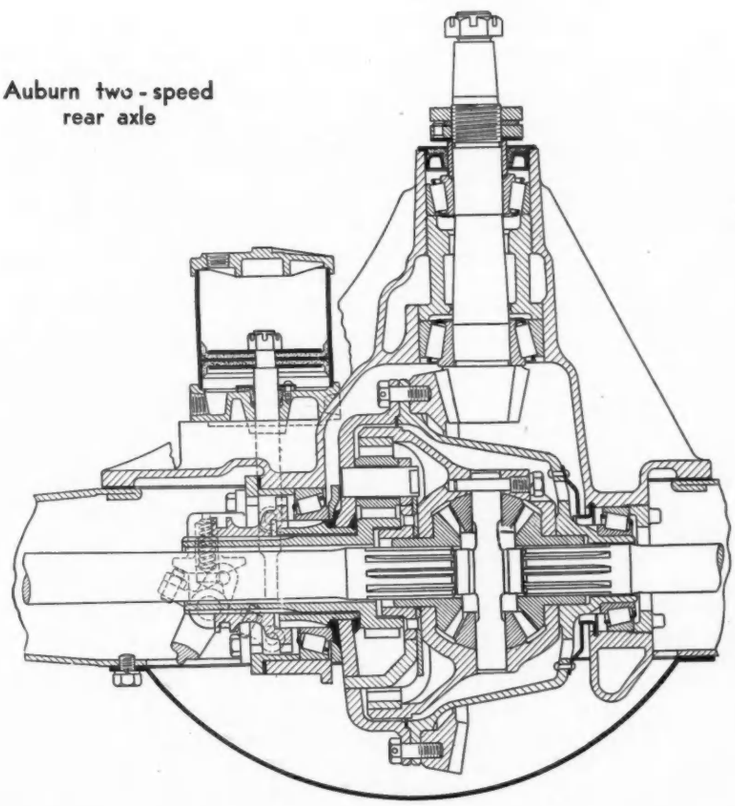
Fans are now made either with blades having unequal angular spacings, or unequal widths, or a particular curvature of the trailing edge near the tip. While car fronts are now generally V-shaped and slope forward from top to bottom, the form is due to the shutters or screen, and the radiator core in most cases is still vertical and plane. Two more manufacturers, Hupp and Graham, now place the radiator filler under the hood, completely out of sight. There has been a general change from louvers to ventilating doors in the hood, and in the Lincoln Twelve these doors are thermostatically operated.

Improvements in lubricating systems have been of a minor character and limited to an extension of features already familiar to the industry. Thus oil temperature regulators have been adopted on the Oldsmobile and the Hupmobile, in addition to the cars which carried them last year. Chevrolet now lubricates the main bearings under pressure, and on two cars already mentioned the pressure lubricating system has been extended to the piston pins by rifle-drilling the connecting rods. Marmon has adopted the Float-O oil intake to the pump which made its first appearance a year ago. There always has been some uncertainty as to the proper angular location for the bleeder hole in the connecting rod head for the more direct lubrication of the cylinder wall, and the writer notes that at least two designers this year have transferred it from ahead of to behind the connecting-rod shank. It seems obvious that with the hole thus located, any oil issuing from it is more likely to reach the most heavily loaded side of the cylinder wall, where it is undoubtedly most needed.

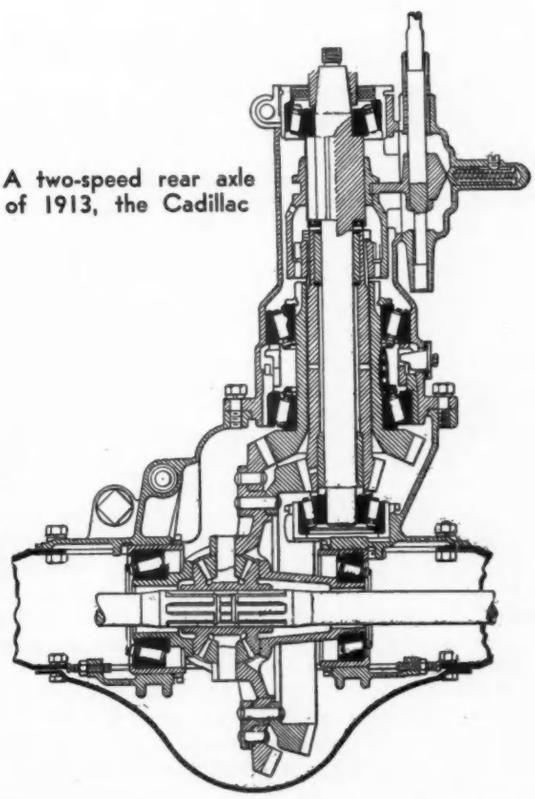
Following Plymouth's exploitation of "Floating Power" there has been a general revision of systems of engine mounting. Rubber mounting is now general, but there is, of course, a difference in the degree of freedom allowed it, both in the vertical direction and around its natural axis of gyration. A distinction may be made also between mountings in which the rubber is in compression and those in which it is in shear.

Pedal Mounting

At least three cars this year are provided with torque arms for the powerplant, indicating that so far as the supporting members are concerned the powerplant has considerable angular freedom. This type of mounting has led to two other changes in design, namely, the fastening of the brackets carrying the control levers and pedals on frame members rather than on the powerplant, and the provision of additional or more rigid frame cross members at the front end, since the



Auburn two-speed rear axle

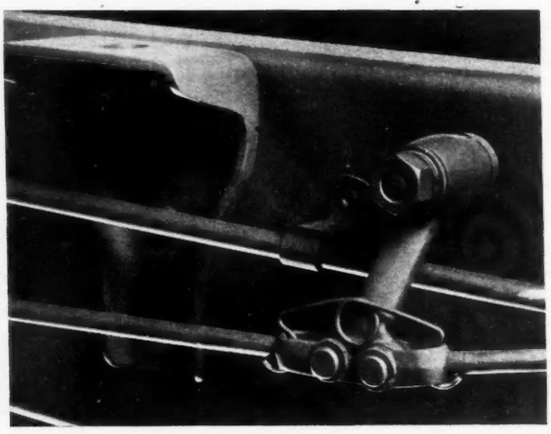


A two-speed rear axle of 1913, the Cadillac

powerplant itself no longer serves as a frame member. A sort of banjo-type cross member at the rear of the engine is becoming a common feature. In the past it was often clamped between the crankcase and the flywheel housing, but in the Plymouth this cross member carries the powerplant through a rubber cushion underneath the housing for the free-wheeling unit, and in the Hupmobile the flywheel housing is secured to the ring portion of the cross member at four points through rubber blocks.

Vacuum Clutches

An innovation of the year of considerable importance is vacuum control of the clutch. It is automatic in that if the foot is taken off the accelerator pedal, and the vacuum in the inlet manifold increases in consequence, the clutch is disengaged. This method of clutch control, developed by the Bendix Aviation Corp., has been adopted so far for use on Buick, Reo, Cadillac, LaSalle, Dodge, Chrysler and De Soto cars, and it is understood that a well-known make in the popular-priced class, which will be out with a new model shortly, will also have it.



Anti-rattle spring in brake linkage of Buick (this view also shows the fuel line outside the frame side rail and the body-supporting bracket)

Combined with Free-Wheeling Unit

In the Dodge, Chrysler and De Soto there is both a vacuum-operated friction clutch and a roller-clutch type of free-wheeling device. In that case, when the accelerator is released the transmission is disconnected from inertia masses at both ends, with the result that gears can be shifted instantly in either direction under all conditions. Like the free-wheeling device, the automatic clutch is always provided with a lock-out so that the operator, if he so desires, can drive the car like a conventional one with foot-operated clutch. With this equipment of both automatic clutch and separate free-wheeling unit an interlocking feature is generally provided so that when the free-wheeling device is locked by the control device on the dash, automatic control of the clutch is rendered inoperative.

Where the clutch is operated automatically by the inlet vacuum the heat generated at its friction surfaces and the wear on its various parts are naturally greater, and it is noted that manufacturers have provided for this by increasing the heat capacity and generally the sizes of the throw-out bearings. Three more manufacturers this year use clutches with damping means in the driven member which serve to prevent torsional transmission of the crankshaft to the transmission, where it would cause gear clatter.

Synchronized gear shifting has made great headway, among the cars on which it has been adopted recently being the Rockne, Pontiac, Hudson, Essex, Studebaker, Pierce-Arrow, Hupmobile, Chevrolet, Lincoln, Franklin and Marmon. Packard and Cadillac now use helical gears for all forward speeds, while generally such gears are employed only for the first-reduction and the intermediate-speed set of gears. A rather unusual arrangement of the gears is found in the Muncie Products synchromesh transmissions used on Pontiac and Chevrolet cars, in that the gears for the intermediate speed are located at the rear end of the housing, and the gears for the low-speed and reverse in the center. Apparently this makes the transmission more compact than it could be otherwise, while on the other hand, it places the maximum gear-tooth loads a considerable distance from supporting bearings. Drawings of the unusual mounting of the gear-shift lever are reproduced herewith. There is a distinct trend toward the use of anti-friction bearings in the secondary cluster gear, the plain bearings of which have been a particularly weak point of low-priced cars for years past.

Free-Wheeling History

Free wheeling made its appearance as a feature of American stock cars in July, 1930; a year ago it was still a comparative novelty and offered on a few makes of car only, but since then the buying public has been thoroughly "sold" on its merits and few cars will be delivered in this country during the current year which will not embody this feature in one form or another. While the first models equipped with a free-wheeling unit had it located within the transmission housing between the first-reduction and intermediate-speed gears, where it is effective in direct drive and intermediate speed only, all now have it at the rear of the transmission. In this position the free-wheeling unit is effective in all forward gears, but the real reason for the change in location is that the adoption of synchronizing clutches made the original location impossible. The roller-clutch type of free-wheeling unit still predominates, but the coil-clutch type has found an important new adherent in Chevrolet.

The movement toward higher steering gear ratios has continued, and in the Auburn twelve a ratio of 22 to 1 is used, which is probably the maximum for passenger cars. To achieve the same purpose which is generally accomplished by an increase in the steering gear ratio, Franklin has reduced the length of the steering-gear arm and made provision in the steering gear so the arm can be swung through a larger angle. Steering wheels now are generally of the three-spoked type, and in several cases the more important instruments on the dash are grouped directly in front of the driver, so he can observe them through the steering wheel. To make it possible to bring the spokes of the steering wheel into the most advantageous position for visibility of the instruments when driving straight ahead, Buick makes the drag link adjustable. An improvement in tie-rod joints is found in the new Oldsmobile, the housing of the joint containing a rubber bushing within which there is a graphite-impregnated bronze bushing. Hudson and Essex new cars now also have rubber-lined tie-rod connectors. The object of the

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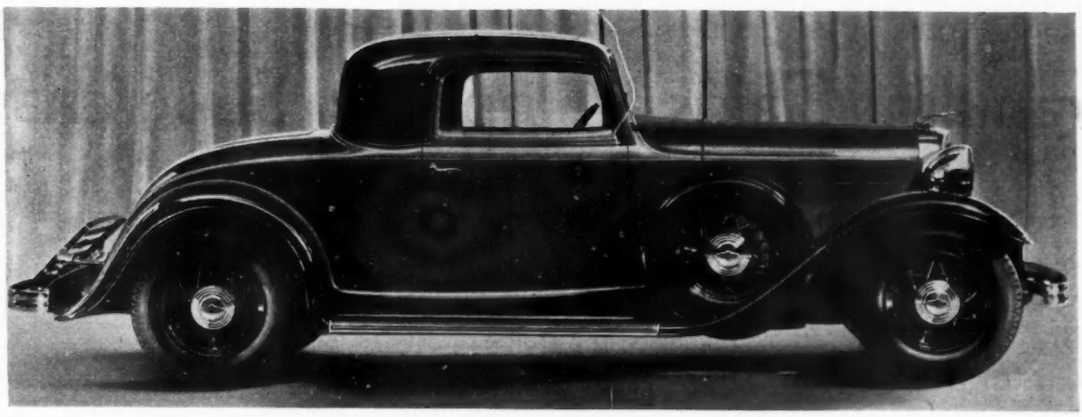


Standard two-passenger coupe on new Lincoln eight-cylinder chassis

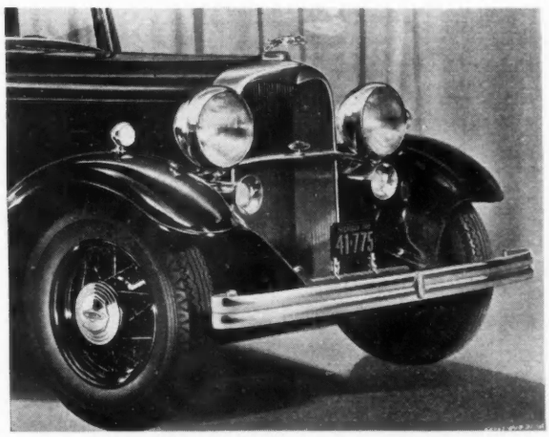
Lincoln Continues the Eight With 136 in. (Shorter) Base

Chassis, virtually identical with V-12, carries synchronizing-gear transmission

IMPROVEMENTS which have been made in the Lincoln V-8 cylinder chassis add materially to ease of control and smoothness of operation. The wheelbase has been reduced to 136 in. Aside from this and the engine, the chassis is virtually identical with the chassis of the new Lincoln V-12.

Features of the chassis are an independent free-wheeling unit mounted back of the transmission, synchronizing cones in second and high gears, and helical second-speed gears; a vacuum-powered booster on the service brakes and use of a woven clutch lining.

The Lincoln V-type eight-cylinder engine is continued. The radiator is of the vee type, the upper part of the shell being molded into a graceful air-flow design. Fenders are flaring and form a continuous streamline with the low-crowned running board. Parking lights are fitted to the front fenders. Spare wheels are regularly mounted at the rear.



Front view of the new eight

The V-8 engine, of 3½-in. bore by 5-in. stroke, develops 120 hp. Cylinder blocks are set at a 60-deg. angle to give non-synchronous firing and smooth operation.

A dual downdraft carburetor is centered above the engine blocks, with a combined air cleaner and silencer fitted to its intake. A diaphragm type gasoline pump, actuated by an eccentric on the camshaft, is used to supply fuel to the carburetor from the 28-gal. gasoline tank under a rear apron.

The crankshaft is of the five-bearing type and is balanced by counterweights. Starter and generator are separate units. The camshaft is driven from the crankshaft by means of a silent chain, which also actuates the water pump. Generator and fan are driven by belt from the camshaft.

Engine temperature control is automatic. Thermostats operate the radiator shutters and hood-side ventilators. Radiator tubes are of flat oval section and set at an angle which assures the maximum cooling effect. The free-wheeling unit can be locked out by means of a lever on the dash.

Brakes are of the two-shoe type and may be applied either by pedal or hand lever. The service brakes are applied by a vacuum-actuated booster controlled by the pedal.

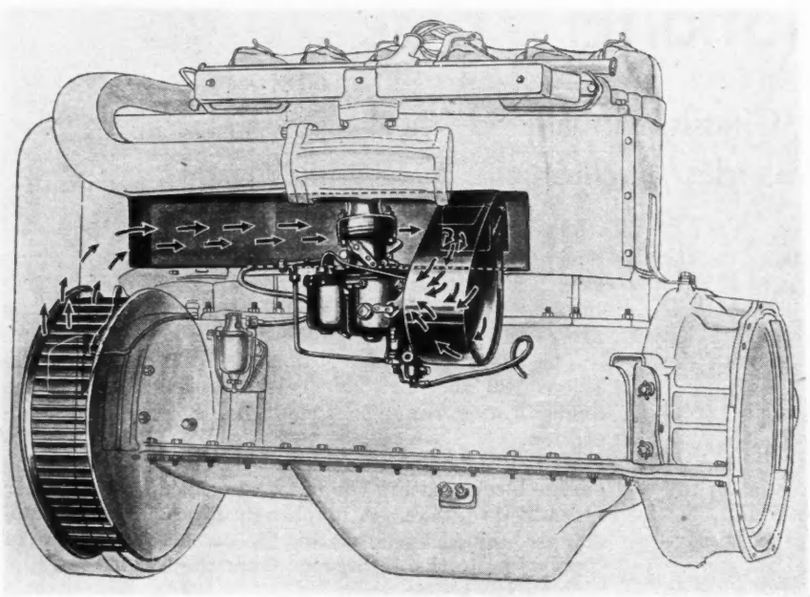
The chassis frame, with unusually deep side members and strong cross-members, is hung close to the road. Four of the cross-members are tubular and exceptionally heavy. The central cross-member is of box-type, heavily reinforced with gusset plates.

Franklin Gains 7 hp. by Supercharging

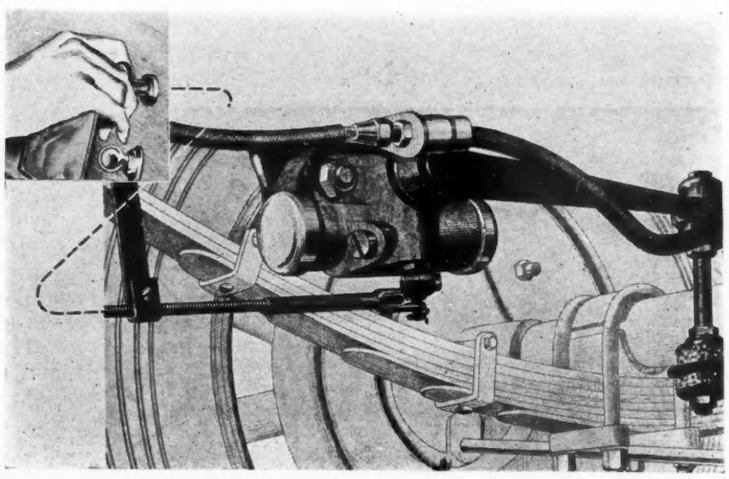
Engine refinements include higher-alloy blocks, ribbing for strength, and counter-bored valve-stem guides

A NEW line of the Franklin Automobile Co., designed the Franklin Supercharged Airman, embodies such features as supercharging of the air-cooled engine, new streamlined bodies and prices considerably below last year's level, which, however, will not be announced until the New York show. The supercharger is said to provide greater acceleration in the lower speed ranges and also to add to the top speed. The piston displacement of the engine remains the same, but by supercharging the output has been increased 7 hp. over a wide speed range. Other new features of the 1932 Franklin include a synchroshift, free-wheeling transmission, selective ride control and Startix.

The Franklin system of supercharging does not involve any additional parts since air under pressure is taken into the carburetor from the blower cooling-system. This air is taken from outside the engine hood and is therefore at a somewhat lower temperature than if it were drawn into the carburetor from under the hood, thereby further increasing the amount of air drawn into each cylinder per cycle. If a somewhat higher air temperature is needed to assure proper vaporization of the fuel, this can be obtained by setting a control valve so that the air is taken in from under the hood.

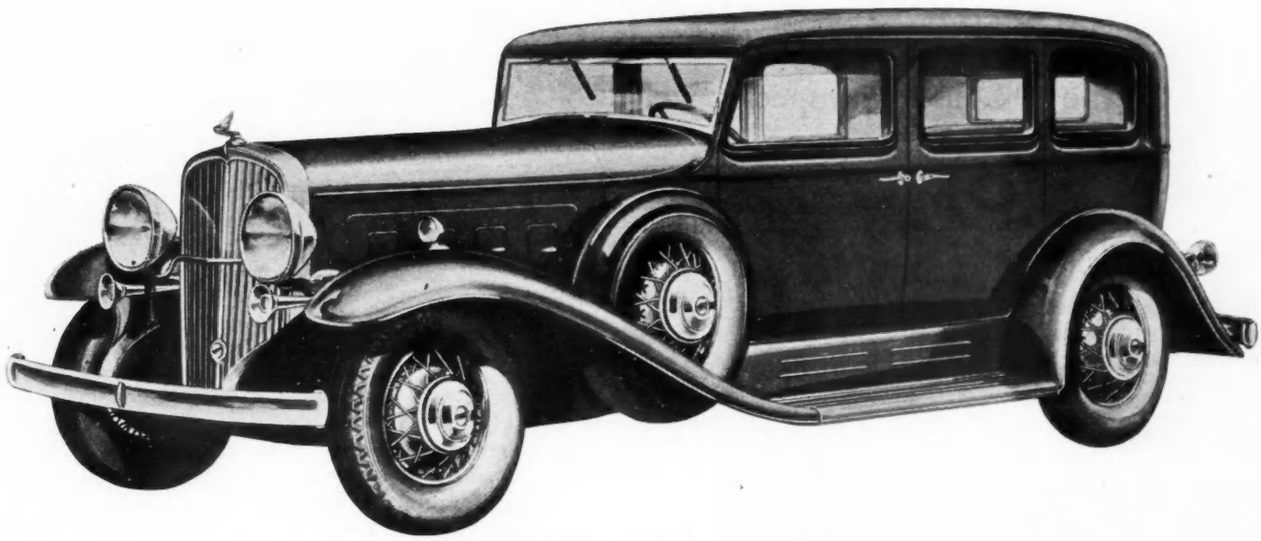


Showing path of air from blower into carburetor



Ride-control shock absorbers for full-elliptic rear spring

From Cooling-Blower Stream



New Franklin seven-passenger sedan

A change has been made in the location of the thermostat actuating the hood shutters. This is now placed outside the air deflector (which latter keeps the hot air leaving the cylinder jackets so it will not strike the dash and footboard), where it is said to respond more accurately to temperature conditions around the carburetor.

Engine cylinders are now made of an iron with higher alloy content, the iron containing a larger proportion of nickel than in the past, and chromium in addition. The cylinders have been strengthened by providing them with vertical ribs, and metal has been added near the base flanges. Pistons are made of a low-expansion alloy, thus reducing variations in piston clearance and the attendant difficulties, and piston pins are nitrided. By placing the ignition unit above the air deflector its accessibility has been increased. The oil filler has also been raised to make it more accessible.

Valves and valve seats of new materials are said to overcome any difficulties due to the use of non-detonating fuel. The valves themselves are made of a material with a high chromium content, while the valve seats are made of a cast iron containing considerable nickel. To prevent trouble from fuel deposits on the valve stem, the lower end of the valve-stem guide is now counterbored. Endurance tests with these valves on the test stand, covering a period corresponding to 20,000 miles of road operation, are said to have left the valves and seats in such a condition that no regrinding was necessary.

Steel-backed bearings with a babbitt lining only 0.010 in. thick are now used in the big ends of the connecting rods. Oil passages in the crankshaft are now of Y form.

A number of changes have been made in the design of the axles. The outside diameter of the front-axle tube has been increased, and the spring saddles are now clamped to the tube instead of being welded on, the saddle being held in position angularly by flattening the tube on one side. Bronze washers are now placed behind all of the gears in the differential.

The 1932 Franklin has a three-speed transmission with synchronizing clutches for the shift from high to second speed and vice versa, and with a roller-clutch free-wheeling unit built into the rear end. Free wheeling is controlled by means of a Bowden-wire mechanism with control knob on the dash. The hill-climbing ability in second speed has been improved by changing the over-all reduction in this speed from 7 to 7.78. Changes in bell housing and crankcase design have made the transmission mounting more rigid.

A selective ride regulator is a new item of equipment, the control device being located on the instrument panel. Full elliptic springs are continued.

Clutch and brake operation have been rendered easier by increasing the leverages of the respective pedals. Similarly, the leverage of the brake lever has been increased, and the emergency brake thus made more effective. To make the operation of the steering gear easier the length of the steering arm has been reduced, and two rollers are now used in the gear instead of a single one, which allows the steering arm to turn through a greater angle. Startix is one of the new features of the 1932 Franklin. It starts the engine by the turning on of the ignition key, and automatically restarts it in the event of a stall.

Eight body styles are being offered on the 132-in. wheelbase chassis, viz., a 7-passenger sedan, 5-passenger sedan, coupe, speedster, victoria-brougham,

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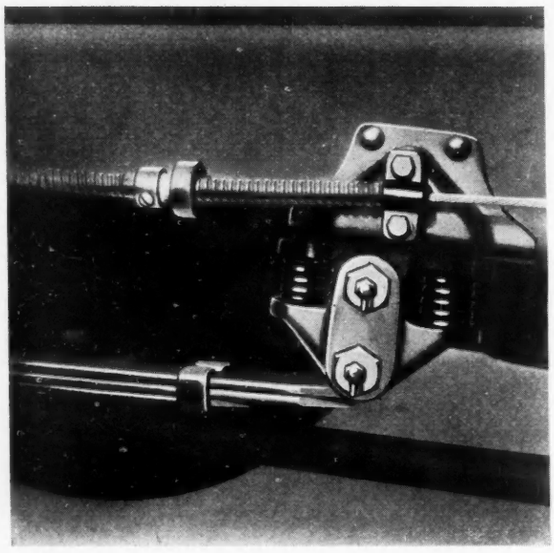
Marmon Introduces New 8-125, 16-cyl.

The eight develops 125 hp. at 3400 r.p.m. and corresponds to the big model in the 1931 line; has specific weight of 27 lb. per hp.; chassis parts well concealed



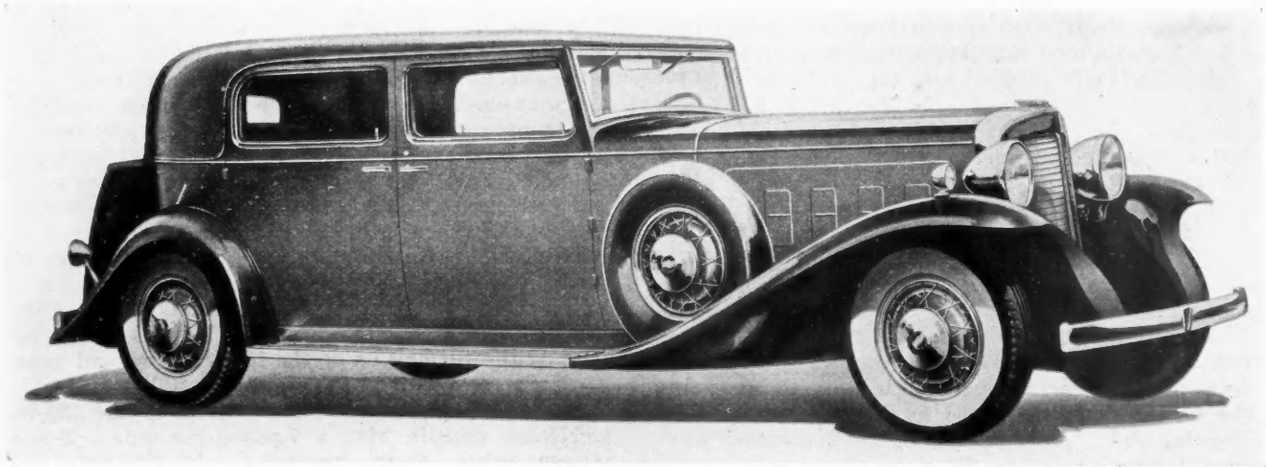
One of the features of the new Marmon 8-125 is a steering stabilizer mounted on the rear end of the left front spring. This device is designed to check any tendency toward front wheel shimmy or oscillation

MARMON MOTOR CAR CO., Indianapolis, will market two lines of cars in 1932, an eight and a sixteen. The Marmon Sixteen, which was introduced a year ago, will be continued unchanged mechanically but with refinements in appearance and in interior design. The eight is known as the Marmon 8-125 and is powered with a straight eight-cylinder engine of 3¼ in. bore by 4¾ in. stroke, developing 125 hp. at 3400 r.p.m., according to the manufacturer. It therefore corresponds to last year's Marmon Big Eight.

The body lines of the eight are quite new. It has a V-shaped, slightly slanting radiator; a slanting windshield; a long, high hood; sweeping, full-crown fenders, and such treatment of the front, rear and sides that all chassis parts are effectively concealed from view.

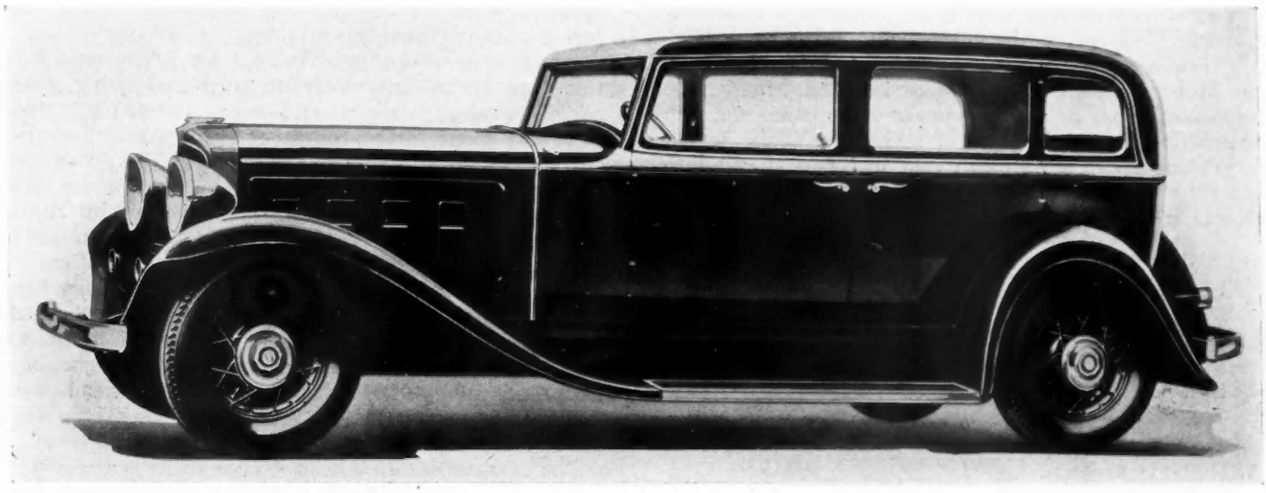
The wheelbase of the 8-125 is 125 in., and the car is comparatively light, the five-passenger sedan, for instance, weighing only about 3400 lb., which gives a specific weight of about 27 lb. per hp. The tread is 58½ in. at both front and rear.

One of the important new features of the car is a vacuum-operated automatic clutch, which also endows the car with free-wheeling properties. The clutch is locked out by means of a button conveniently located



The five-passenger close-coupled sedan on the new Marmon 16 145-in. wheelbase chassis

Type Continued With Body Refinements



The new Marmon 8-125 five-passenger, four-door standard sedan, one of the six standard and de luxe body styles on the new 125-in. wheebase chassis

This shows the attractive arrangement of the instruments on the new Marmon 8-125. They are so arranged that the driver may glance at them through the thin-rim, three-spoke steering wheel by only slightly shifting his eyes from the road

on the dashboard. The transmission is of the three-speed type and is provided with gear-shifting synchronizing cones.

Ride-control shock absorbers are an item of the equipment. These may be adjusted by means of a lever on the steering column. A thick layer of heat-insulating material has been applied to the dash, and the toeboard as well as the floorboards of both compartments are covered with insulating material designed to keep out heat, noise, dust, and fumes.

Instruments and controls on the instrument board are grouped in a novel way. All instruments, including the airplane-type speedometer, gasoline gage, oil pressure gage, heat indicator and ammeter, are grouped at the left of the instrument board so that the driver may glance at them through the three-spoke steering wheel with only a slight movement of his eyes from the road. A feature of the speedometer is that it has two sets of figures, one showing miles per hour and the other engine revolutions per minute.

In a recessed section in the center of the instrument board are located the hand controls, the ignition switch and an ash receiver, while at the right of the instrument board is a large storage compartment with a door in which parcels, road maps, gloves or other articles may be kept. Starter, lights and horn are operated from a single button at the top of the steering column. This button is turned to the left or right to operate the lights, is depressed to sound the horn and is pulled outward to operate the starter.

A new item of equipment this year is the Float-O oil intake, whereby oil is drawn into the oil pump from the surface of the crankcase supply, where the oil is the purest and where its temperature and fluidity increase most rapidly after the engine has been started up. The steering wheel is of the three-spoke, thin-rimmed type and is finished in black.

Mechanical brakes of the two-shoe, self-energizing type, with cable operation, are used on the new car. They have a total braking area of 244 sq. in. The

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Centrifuse Brake Drums Have Steel Ring

REFERENCE has been made repeatedly in recent car descriptions in these columns to Centrifuse brake drums, which are being manufactured by the Motor Wheel Corporation of Lansing, Mich. The term Centrifuse describes a brake drum composed of a foundation ring preformed of strip steel stock, which is provided with a lining of cast iron introduced into the ring while in the molten condition and while the ring is at a high temperature and being rotated at high speed, so that the iron is fused to the steel while subjected to centrifugal force.

Among the advantages claimed for brake drums of this type are reduced wear of drum and lining, more rapid heat dissipation, a tendency of the drum surface to retrue itself in the course of service, and less frequent need for adjustment and repair. The process of fusing a layer of dense cast iron to the interior of a pressed-steel foundation ring was developed by Motor Wheel Corporation in collaboration with Campbell, Wyant & Cannon, foundrymen of Muskegon, Mich.

The first step in the manufacture of the Centrifuse is the rolling out, from strip stock, of the steel foundation ring illustrated in Fig. 1. The method is similar to that of forming a wheel rim, and four operations are required to shape the duplex ring with its beads and flanges. One ring makes the contact rings for two Centrifuse brake drums.

The circumferential beads serve to keep the drum

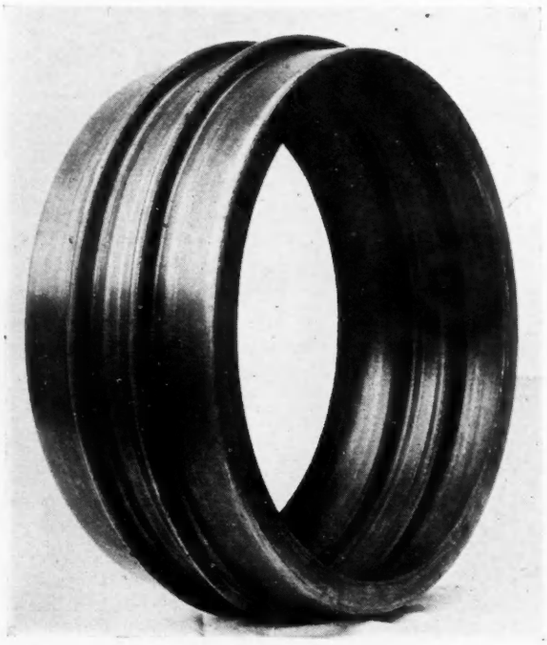

Fig. 1—"Centrifuse" steel foundation ring; formed in four operations, like a wheel rim. Note the circumferential beads and the right-angle flanges serving as pouring mold and receiving the brake drum back

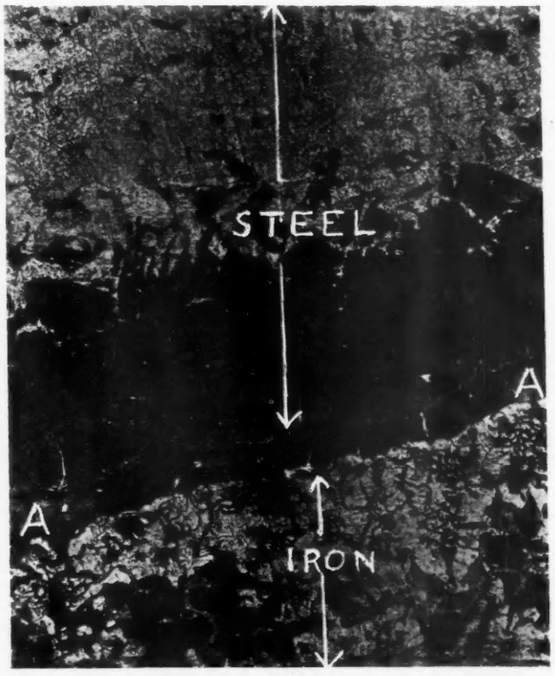

Fig. 3 (above)—A-A shows the dividing line between steel of foundation ring and iron braking surface

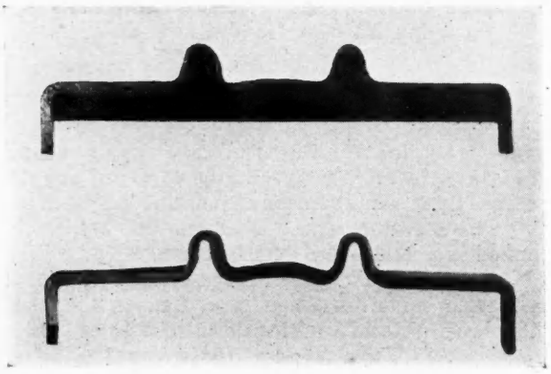

Fig. 2—Cross-sections of the "Centrifuse" brake ring before and after centrifusion, showing in the upper cut the close bond between steel and iron

With Iron Friction-Surface, Welded Back

High wearing quality and automatic retruing claimed for new Motor Wheel Corp. product

round under braking conditions; they also function as sealing beads for the fused iron. The outer right-angle flanges have the two-fold purpose of forming a fixed mold for the iron as it is poured, and of receiving the back of the brake drum which later is projection-welded to the Centrifuse ring. When formed, the steel ring is sand-blasted to remove scale and give a clean fusion surface.

The thickness of the steel rings varies with their diameters and with the brake loads for which the drums are intended. For an 11-in. drum the steel stock is 3/32 in.

For the actual fusing operation special machines have been designed in which the steel foundation rings, preheated and coated with flux, are rotated at great speed. Molten iron from a self-measuring ladle is poured into the rapidly rotating ring, and the iron, retained between the flanges, is spun into an even layer of relatively dense metal.

The bond between the steel of the foundation ring and the cast iron is shown in the section of Fig. 2, and the character of the bond is brought out still better by the photomicrograph, Fig. 3, in which the arrows mark the dividing line between the steel foundation ring above the line and the mass of iron below it. The darker section above the demarkation line represents carbon which was freed from the iron in the fusion process and penetrated the steel for a considerable distance.

The duplex ring is now cut through the center, rough-turned and trimmed. To each of the resulting two rings a drum back, centered on the fused ring by a shallow turnover flange, is projection-welded at 12 points (Fig. 4). The drum is then completed by riveting on the hub and by finish-turning the braking surface concentric with the axis.

The claim that the Centrifuse brake drum retrues itself automatically is explained as follows: Cast iron, in spite of the fact that it is materially softer than steel, does not sliver in its rubbing contact with the brake lining; but even if grooving should take place due to hard spots in the lining, to the accidental entry of grit, or to wearing down of the lining until the rivet heads scrape the drum, it will not be necessary to rebore the drums, as new lining on the brake shoes in service will automatically smooth the drum surface.

In the early development work, iron was fused into single-piece pressed steel drums, in which the ring section and the back were necessarily of the same gage. It was found, however, that this design did not assure permanent roundness and adequate heat dissipation.

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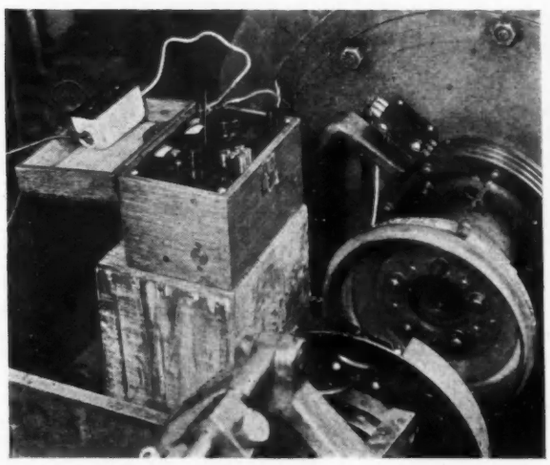


Fig. 5 — Laboratory heat transfer tests, which yielded the chart, Fig. 6

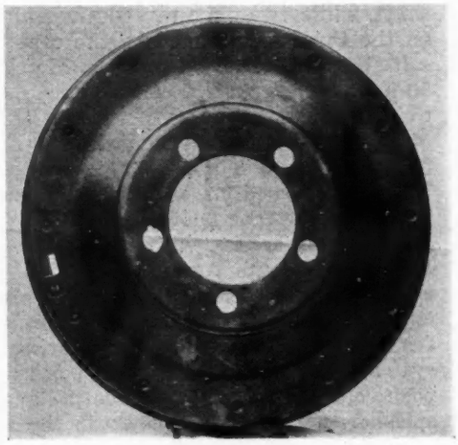
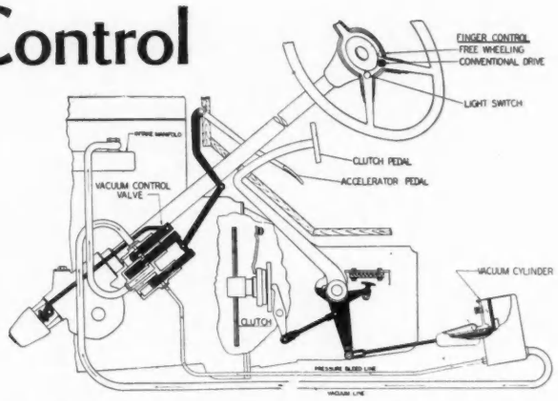


Fig. 4—As the "Centrifuse" brake ring is welded to the back, all parts of the drum expand together and the braking surface remains perfectly flat and in full contact with the lining

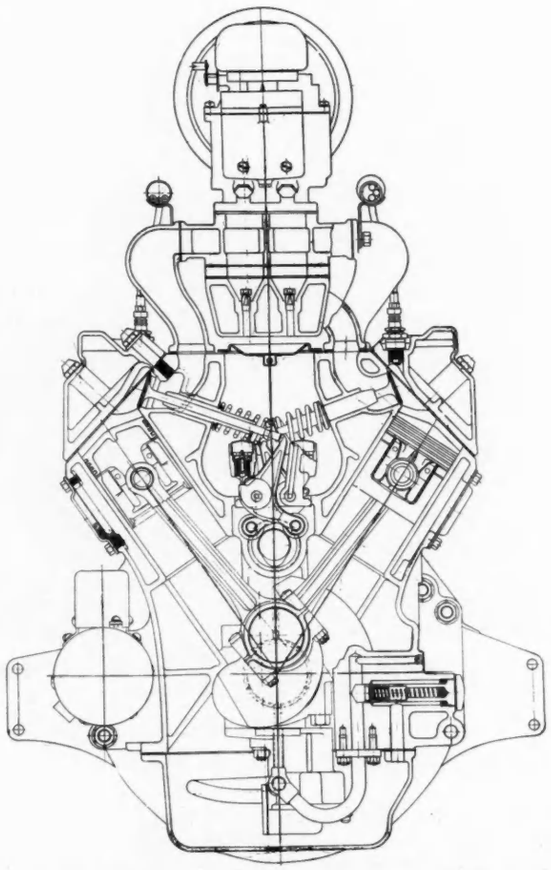
Packard Has Clutch Control

A FURTHER detail on the Packard 12-cylinder engine, not included in the previous story, has been made available. The combustion chamber is largely formed by the piston head, which is dome shape. Valves are at a slight angle from the horizontal, and cylinder heads are at a right angle to the top of the cylinder bore. The result is that an inverted dome type of chamber is obtained. Spark plugs are located in the end of this chamber—a rather unusual feature. The offset portion of the chamber is formed between the cylinder heads and the far side of the piston head.

Incidentally, the bore of the Packard "12" is now 3 7/16 in. instead of 3⅜ in., as was the former plan. On all Packard cars, including the light eight, the standard and de luxe eight and the new 12, an automatic clutch control has been adopted. In place of the throttle control button there are two clutch control valves, one operated by the accelerator pedal and one by a button on the steering wheel. This control serves as a lockout for the automatic clutch mechanism. The main operating valve is controlled by the accelerator pedal, and consists of two plungers, one to open and close the line from the intake manifold to the vacuum-operating cylinder and the other to control the rate of air bleed from under the head of the piston in the vacuum cylinder. The rate of bleeding is therefore dependent on accelerator position.



This illustration shows the automatic clutch installation in diagrammatic form



Section of Packard 12-cylinder engine showing form of compression chamber

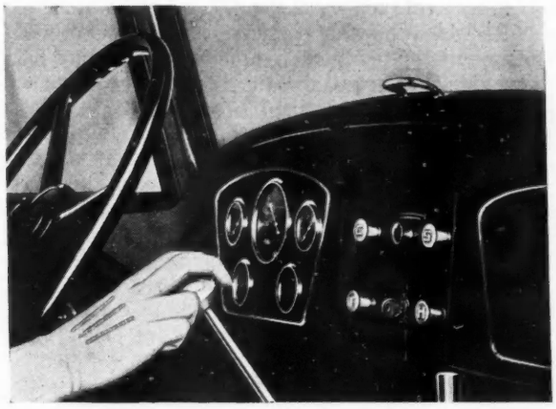
Federal Adds 1½-Tonner

A NEW 1½-ton truck listed at $695 has been announced by the Federal Motor Truck Co. This Model E-3 is similar in appearance to the former 1½-ton Federal truck which sold at $895. The design remains substantially the same, there being no change in engine size. The truck now has a chromium-plated radiator and is available in four lengths of wheelbase, from 130 to 166 in. Chassis weights range from 3225 to 3325 lb., according to wheelbase, while the allowable gross weight is 8500 lb. The Continental 21R engine has a flexible three-point mounting on rubber and cushion springs.

Transmissions are of the four-speed type, mounted in unit with the engine, and have all except the reverse idler gear mounted on anti-friction bearings. The gear ratio in low is 6.40 to 1, and is combined with axle ratios ranging from 5 2/3 to 6 6/7 to 1. The 5 2/3 axle ratio gives a speed of 47 m.p.h. at 2800 r.p.m. engine speed.

The short-wheelbase model has a single propeller shaft, while two-unit, three-universal shafts are used on the three longer models, the center bearing being self-aligning. Drive is of the Hotchkiss type, with 50-in. rear springs. Axles are manufactured by Clark.

In addition the same company has brought out a 5-6 ton truck with Timken "high-traction" differential. This is furnished either with hand-operated hydraulic brakes, and is then known as Model C-7, or with Westinghouse air brakes, when it is known as Model C-8. It supersedes the former models 4C-6A and 4C-6B. Features are increased capacity, increased motor size, larger tires, deeper frame fish-plates, more attractive fenders, the Federal Reservoil spring pin lubrication system, etc. Battery and tool box are located at opposite sides between frame side-rail and running board splasher, with a hinged cover in the splasher. Front spring pins are extended across the frame.



Marmon instrument board showing all instruments mounted directly in front of driver

(Continued from page 84)

rubber lining is to prevent rattle. Tubular front axles have been adopted by Hupmobile and Rockne and are now found on four makes of American passenger cars.

Brakes

As regards brakes, the most important development of the year has been the rapid adoption of cast iron or cast-iron-lined brake drums. The first announcement the adoption of such drums was made by Chrysler last summer, and Auburn, Graham, Cadillac, De Soto, Plymouth and Dodge have followed suit since. All of the brake drums here referred to are of composite construction, employing pressed steel for structural strength and lightness, and cast iron for its excellent frictional qualities.

Brake dimensions this year are larger on about a dozen makes of cars. This change in design apparently was necessitated by the adoption of free wheeling, which places greater loads on the brakes. Cable connections are found on more cars than in the past. The new Lincoln Twelve has a vacuum-type brake booster. Packard revised its braking system and among other changes placed the emergency brake lever (on the left of the driver) outside the frame side rail so it can be made straight, and it also mounts the brake cross shaft in self-aligning spherical bearings which are automatically lubricated. The tendency to mount the brake pedal on the frame instead of on the powerplant has been referred to already. Anti-rattle springs are being used on brake linkages more and more, one of the latest to adopt them being Buick.

With changes in engine power there have been changes in standard rear axle ratios in a number of cases, but this is merely a matter of striking a balance between maximum speed and maximum acceleration in high gear, and does not indicate any new tendency. Cadillac, which has consistently used the torque-tube construction, now makes the tube by rolling it up from sheet metal and then projection-welding the joint.

Wider Treads

There has been a further increase in tread widths, more especially in the rear tread, but in some cases also in the front. In consequence of this the term "standard tread" has lost practically all significance, except as a figure for comparison. While the great majority of cars produced in Europe have less than standard tread, most of our cars outside of the low-priced class have a tread larger than standard. Graham, Cadillac and the Chrysler Imperial have gone to 61 in. for the rear and the Studebaker President has a rear tread of 61½ in. The primary reason for the adoption of wide treads was the introduction of balloon tires, which left insufficient clearance for tire chains if a seat of sufficient width for three normal-sized passengers was wanted. With the general improvement in roads in this country the need for a standard tread has been practically eliminated, and in the case of high-speed cars the greater stability resulting from a wide tread is an advantage of considerable importance.

At least two makers (Buick and Franklin) this year put out their cars with bronze thrust-washers back of the gears in the differential. This has long been general practice in high-grade commercial vehicles, but is rare in the passenger car industry. Differential gears in service develop considerable play or backlash, through wear, which must give rise to severe shocks on the drive when this is taken up suddenly. With the ordinary type of differential, nothing can be done about this, but when thrust washers are placed back of all gears, the backlash can be readily eliminated while overhauling the axle by inserting new washers of either standard or oversize thickness, as required.

Show Curtain Rises on Larger Engines and More Equipment

Two-Speed Axle

Something of a departure in passenger-car practice is the offering of a two-speed axle on the new Auburn Twelve. Two-speed axles in themselves are not new, having been used on a Cadillac Four prior to the introduction of the eight in 1914, and on a large car called the Austin, which was built in limited numbers. But in these cars there were two pairs of bevel reduction gears, and one or the other of the two bevel pinions was locked to the driving shaft, while in the new Auburn there is only one pair of bevel gears and in addition a set of planetary gears which give a second reduction. The planetary set can be either rendered operative (thus producing the double reduction) or locked by means of a vacuum chamber. In a general way the advantages inherent in the two-speed axle are very much the same as those which it was sought to realize through the use of four speeds in the transmission, viz., an increase in maximum speed and a reduction in the average engine speed when using the smaller overall reduction ratio, combined with high acceleration when using the larger reduction ratio. The two-speed axle with two pairs of bevel gears has become more or less impractical since the days of the Cadillac Four, because of the reduction in wheel diameters and the general increase in engine power and rear axle ratios, which would give inadequate road clearance.

Hypoid Axles

The Hupp Motor Car Company has gone to the hypoid gear drive, the object of which is to make possible a lowering of the floor of the car. In both this axle and in the Packard axle with hypoid gear drive, the so-called banjo is now tilted at an angle of about 45 deg., which reduces the distance between the axis of the rear

axle and the highest point of the center housing, so that the rear-seat pan can be lowered relative to the axle.

Ride control is another feature that has caught on rapidly. First announced as standard equipment by Packard in June of last year, ride regulators now figure in the equipment lists of Buick, Auburn, Oldsmobile, Graham, Packard, Franklin, Pierce-Arrow, Cadillac and Marmon. This refers to control of the damping power of the shock absorbers by means of a control device on the instrument board or dash. Two general principles are employed in ride control mechanisms. Operation of the control device on the dash either results in a positive change in the cross-sectional area of the orifice in the shock absorber through which the fluid in the absorber must pass as the springs compress and rebound, or it results in a variation of the pressure of springs on check valves past which the fluid must flow. Another type of control or regulation, in which viscosity changes of the liquid in the shock absorbers are compensated for by means of a thermostat, has also made its appearance, and is standard equipment on at least one make of car.

Spring Suspensions

Spring covers are more widely used, among the makers furnishing them for the first time in 1932 being Studebaker, Dodge and Pontiac. At least two more makers have added kick shackles at the front end of the left front spring, and one maker who in the past has used a shackle embodying steel springs, now uses a rubber type instead. A rather interesting spring shackle is used on the Buicks and Cadillacs this year, in which the bearing surface is in the form of a screw thread instead of a plain cylindrical surface. Lubricant is forced into an axial hole extending part way through the spring bolt, through a lubricator fitting at the outer end, and passes on to the bearing surface through a radial hole at the middle of the length. The screw threads evidently are intended to retard the loss of lubricant.

The old carriage-days practice of neatly pointing the ends of spring plates practically passed out when quantity production came in and chassis springs were completely hidden from view by mudguards and aprons, but with a sharp, square end to the spring plate there is evidently a concentration of stress in the plate next above, and also a tendency for the end of the plate to scrape the lubricant from the plate next above. Buick has taken cognizance of these defects and now not only curls the ends of the plate so they will come in contact over their whole lengths only when under maximum load, but also trims off the corners of the plates. On Chrysler cars oilite disks are used between ends of spring plates to prevent changes in spring action with changes in the state of lubrication, and to eliminate squeaking.

Frame Design

Many changes have been made in frame design, a considerable proportion of them incidental to other changes, as in methods of engine mounting, for instance. In general the tendency is toward stiffer frames.

To achieve this greater stiffness, side rail sections have been increased in depth, additional cross-members are being provided, and frame members in some instances are made of box section. In the Cadillac Eight and Twelve the side rails are now 9 in. deep, and in the Cadillac Sixteen, the depth is 10 in. Side rails in some instances are stiffened by the insertion of channel sections of the same outside dimensions as the inside dimensions of the main channel, and the inserts may have the open side either toward the inside or toward the outside. The former practice has prevailed in the past and commends itself because of the ease of joining the two sections by riveting. However, now that welding is being introduced in frame manufacture, there are indications that the other plan will be adopted more widely, since a box section made up of two channels is certainly more rigid than a section made up of the same two channels with the webs close together.

The X-type of cross-member, which has been used on Mercedes cars for about 25 years, and was introduced here some years ago by Stutz and Auburn, is being increasingly used. It is intended to increase the torsional stiffness of the frame and to prevent weaving, that is, forward motion of one side rail relative to the other. In the Hupmobile frame inserts or cuffs are used in the side rails at the rear kick-ups, so the depth of section at this portion of the rail can be made smaller and the frame consequently dropped lower.

A novel type of frame, so far as passenger cars are concerned, is used in the new Graham models. It is quite obvious to those with a mechanical turn of mind that where there is a deep kick-up in the frame over the rear axle, the stiffness of the rail in the vertical plane suffers materially. To eliminate this loss in rigidity, the new Graham frames are made with a vertical slot in each side rail, through which the rear axle passes. Similar frame constructions have been used in motor trucks in England for some time, but this is apparently the first application to passenger cars.

The Graham frame differs from the conventional design also in other respects, one of its outstanding features being that the front springs are located outside the frame, which permits of suspending the frame from these springs, over the drop in the axle center, instead of mounting it over the springs.

Hupp Trussed Frame

Undoubtedly, the most radical departure in automobile design so far announced for 1932 is that whereby the front end of the Hupmobile frame and cowl is worked into a series of triangular trusses. That there has been a good deal of trouble from insufficient rigidity of the front end of modern cars was made evident by the paper on Instrumentation for Tests on Body and Frame Rigidity contributed to the Summer meeting of the S. A. E. by Athel Denham last summer. Front-end vibration such as wobble and shimmy may not be due directly to lack of sufficient frame rigidity, but the latter certainly intensifies its objectionable effects. Besides, that there is insufficient stiffness of the front end is generally obvious by watching the radiator shell and hood when a car is being driven at speed over a rough spot in the road. Since the Hupmobile construction has been fully described in these columns (in the Jan. 2 issue), it is not necessary to enter into details here.

In the endeavor to reduce the overall height of cars, the clearance between the rear axle housing and the frame has been reduced to the minimum, and cutouts are provided in the rear-seat pans to prevent the pans from being hit by the center housings when the springs close up under impact.

There is a general trend toward wheels of smaller diameter, accompanied in most instances by a change to tires of larger section. Wheels of 17-in. base diameter are used in a number of larger cars, with large section tires, and the Chevrolet this year carries 18-in.

wheels, as compared with 20-in. last year. Wheels have been shrinking in size for a good many years, and the recent announcement of so-called Jumbo tires by two rubber companies conjures up visions of a time when there will be nothing left of the automobile wheel except a flanged hub, a rim and a brake drum. But in view of the requirements in undeveloped countries this is probably quite a while off yet, for low-priced cars at least. Three more manufacturers this year have adopted the drop-center rim, which is no longer confined to low-priced cars.

In body construction, a great deal of attention has been paid to heat and noise insulation, and insulating materials in heavy layers are applied to the floorboards, toeboards, dash and cowl sides. Many radiator fronts now slope and are either V-shaped or rounded. Windshields have been sloped for some time to reduce annoyance from the reflection of light from cars in the rear, but this year in some cases the slope has been increased in order to obtain better aerodynamic qualities, the effect being further augmented by the elimination of outside visors. The inside visors now used in lieu of the outside ones sometimes are so arranged that they can be adjusted universally and therefore used also to give protection against light entering through the window in the door.

Centrifuse Brake Drum Has Steel Ring

(Continued from page 91)

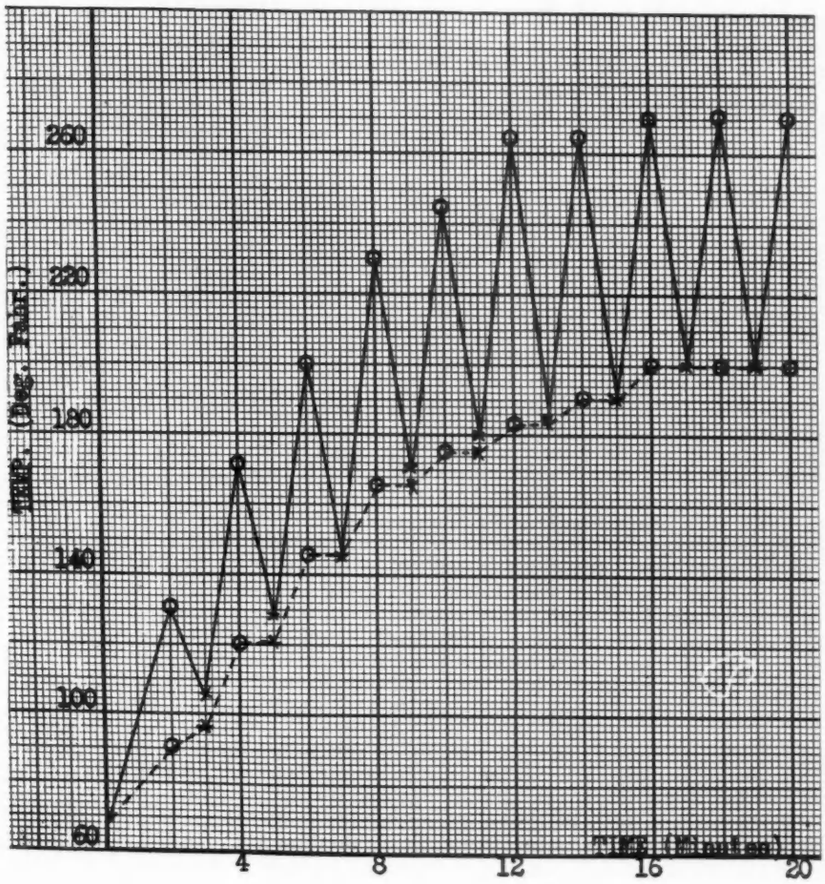


Fig. 6—Curves showing relation of heat in the brake ring and back of an 11-in. projection-welded drum. Thermocouple on back placed between welds

Solid line denotes Brake Ring. Dotted line denotes Back. O denotes temperature (at stop). X denotes temperature (one minute after stop). Lower scale is time in minutes and the side scale is temperature in degrees Fahrenheit

Continued experimentation led to the present design combining three elements, the steel foundation ring, the fused iron friction surface, and the welded back. The steel ring can be made from sheet of any gage desired, and ribbed or rolled as thought best, and the thickness of the iron liner can likewise be varied. The gage chosen for the back is based on the depth of the drum, the contour of the back, the type of brake, the hub-flange proportions and the method of wheel mounting. With the three-element design, internal stresses that may be rolled into the foundation ring, are removed when the molten metal is poured into the ring, the latter being allowed to cool more slowly after the metal has solidified.

The claim for rapid heat flow away from the friction surface in the Centrifuse drum has been substantiated by dynamometer and road tests. This is of importance in that it keeps down the temperature of the drum and its expansion due to heating, which is objectionable because it reduces the pedal-travel reserve. A series of heat transfer tests were conducted with three 11-in. drums, the first a Centrifuse drum with projection-welded back, the second a Centrifuse with arc-welded back, and the third a pressed-steel drum of conventional pattern. The drums were set up on the dynamometer revolving at 720 r.p.m., corresponding to a car speed of approximately 60 m.p.h. Readings were taken with thermocouples attached to the drums (Fig. 5).

Ten stops were made on each drum, one stop every two minutes. Two sets of readings were taken, one from the brake ring, one from the back—the first readings upon stopping, the second readings one minute after each stop.

The results obtained with the projection-welded Centrifuse drum are plotted in Fig. 6. It will be seen that the temperature of the ring was much lower one minute after stopping than at the moment of stopping. However, with the single exception of the first stop, the temperature of the back was the same one minute after stopping as at the moment of stopping.

Complete Core Units in Stock Simplify Electric-Motor Maintenance Problem

Standard motors are now applicable to a wider variety of mountings than ever before, with consequent savings in cost and time

by J. V. Hunt
Westinghouse Electric & Mfg. Co.

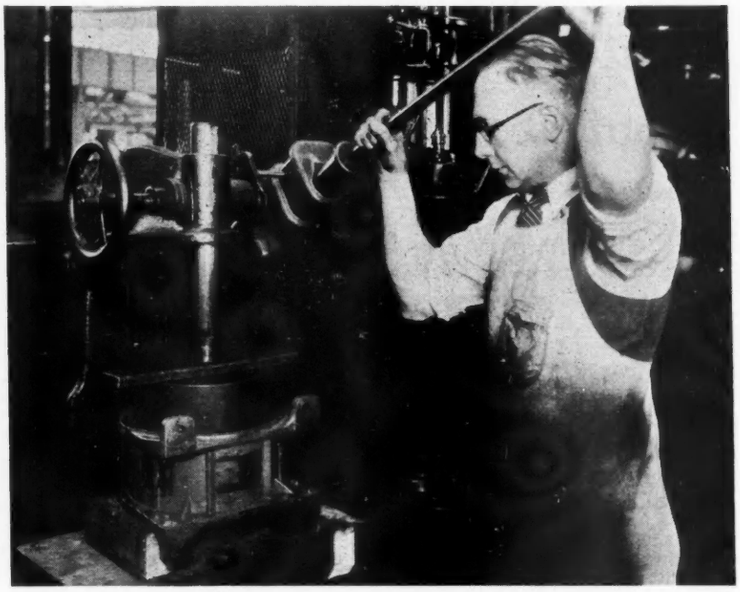


Fig. 1—One of three steps in the new method of repairing an induction motor primary. Pressing out the removable core as shown, taking a spare core from stock, and pressing it in. Repairs made in this manner make a motor as good as new, and cause very little interruption to production

A PRACTICAL solution to the problem of plant motor maintenance has been found in the adaptation of completely wound and insulated core units which are removable and interchangeable in all motors of a similar rating and type regardless of mechanical form. A single standard spare core unit will do for any motor of that rating, be it horizontal, vertical or of some special construction, such as built-in, or side mounted.

There are a multitude of electric motors with different modifications and a wide variety of ratings used in a large manufacturing plant. It is of great importance to find some way to simplify maintenance problems connected with such a miscellaneous array of equipment. There are important operations where it is undesirable to allow any appreciable amount of time to be lost for rewinding the primary of a motor damaged due to some accident or unforeseen condition. To carry in stock complete spare motors of various sizes is expensive.

Consider, for instance, the machines that are driven by 10 hp., 1750 r.p.m. squirrel-cage motors in the plant of a manufacturer of automobile accessories. He has three drilling machines using motors of this rating, overhung side mounted, with the inner bearing supplied by the machine builder. In the plant are several pumps using horizontal motors of the same rating but with drip-proof covers, while other pumps use motors of vertical construction. Several lathes from an Eastern machine tool builder use motors of special bracket construction. Altogether in the plant, there are thirty motors of this rating, using four different mechanical constructions. Yet the primary core is identical and interchangeable in all of these motors.

The procedure when a primary coil is damaged in service is the simplest imaginable. The old core unit is pressed out and the new one quickly pressed in (see Fig. 1). The result is a motor as good as new, with new factory-baked insulation, free from flaws, and completely tested. Stock coils and coil winding are unnecessary and the twenty-four to forty-eight hours ordinarily required for insulation baking are gained.

Fig. 2—The untreated wound core. Extra insulation of heavy-treated cloth is inserted between the adjacent coil ends where full phase voltage exists. The insulation of the completely wound stator for the standard stock motor is given a dual protection treatment

The cost of this new method is less than the average cost of rewinding the motor, not counting the time lost to plant production by having the motor out of service.

The user of direct motor-drive is primarily interested in reliability, simplicity and ease of making repairs, while the machinery manufacturer is interested in all of these features, and in addition, he is vitally interested in simplicity of mechanical construction which permits adaptability of standard stock motors to different types of mounting. Recent developments in motor design by the electrical manufacturers have gone a long way toward reaching the ideal set by both the user and the machinery manufacturer. Not only can standard motors now be applied to a greater variety of mountings than ever before, but they include features in design that benefit the user as well.

The insulation used on the windings of a motor must always receive first consideration. Formerly, it was the practice to specify for applications where a considerable amount of moisture and mild chemicals were prevalent, motors with specially treated insulation which would protect the windings against these conditions. For other installations, where oil and abrasive dust were encountered, a different type of insulation was used. In the modern motor, these various applications are all taken care of by using for the

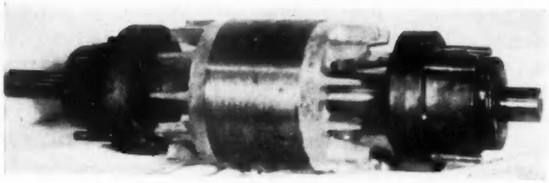


Fig. 3—Aluminum rotor with rotor bars, end rings and blower vanes pressure cast in one solid unit. Shown complete with self-contained cartridge type bearing housings. Dust-tight and grease-tight

standard motor insulation (Fig. 2) which will effectively protect the windings from all of these destructive agencies, and consequently, the user need no longer specify a special motor and wait for longer delivery to meet any of these conditions, except for cases where a combination of conditions is very severe and where the additional cost of special insulation would be warranted.

High-Frequency Test Necessary

After great care has been used in winding a motor, it has been found in practice that the ordinary tests between phases and to ground may still permit a hidden weakness in the insulation to go by unnoticed, but such a defect may cause a failure after the motor has been put in operation. In addition to the ordinary tests, the recent adoption of a high-frequency test makes it possible to apply high voltage through each coil, thereby testing between individual turns and providing a very thorough test for insulation. High-frequency-tested standard motors may now be obtained from stock.

The rotors for wound-rotor motors are given treatment similar to the primary windings as described above, and for the recent designs of squirrel-cage motors, a pressure cast rotor is used. In it the rotor bars, end rings, and blower vanes are all die-cast in one solid piece (see Fig. 3).

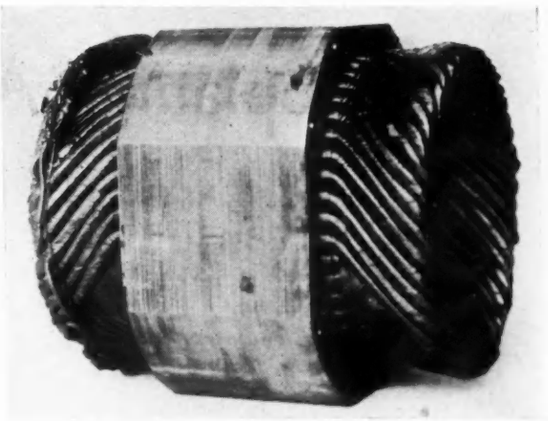


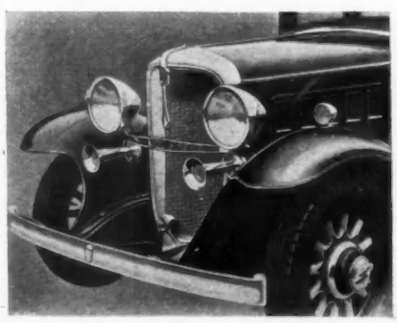
Fig. 4—Renewable prewound core unit. A damaged stator core may be pressed out quickly and a new prewound core unit pressed in, thus assuring greater continuity of operation. This unit is interchangeable in motors of similar ratings, regardless of their mechanical form

For unusually severe conditions and especially where large amounts of abrasive dust are prevalent, such as in automobile foundries where the machining work is done, the fan cooled type of motor is largely used. The windings of these motors are entirely sealed from the surrounding atmosphere, yet the motor is cooled by outside fans.

Machinery manufacturers have been making great progress in the production of specialized machinery. To fit in properly with the design of these machines, the tendency is toward built-in, or partially built-in, construction. The recent trend in motor design is in keeping with this program in that a wide variety of standard mechanical units for different types of motor mountings are now built on a production basis. It is no longer necessary to build a special motor to accommodate special mountings. In considering these various mechanical mountings it is of primary interest to the user to note that the electrical units are separable and interchangeable in all motors of similar ratings regardless of mechanical form.

Durant Exhibits Two Models

The Durant 621 line includes six standard body types for 1932, ranging in price from $550 to $655. The 622 model lists at $700 for all body types. Front-end appearance of the cars has been changed as the accompanying illustration shows



Electroplating Aluminum on Production

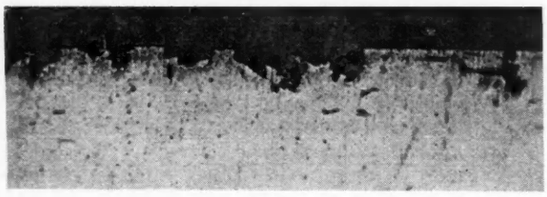
by W. S. McArdle
Aluminum Co. of America

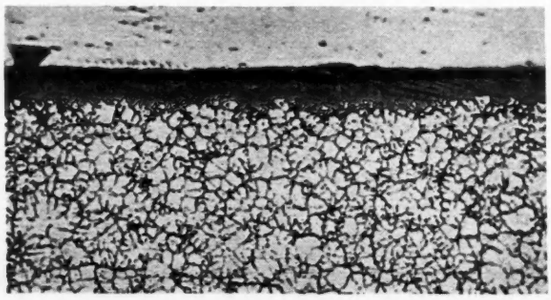
Technique developed by Harold K. Work and associates built on improvement in surface preparation methods, including cleaning, activation and roughening

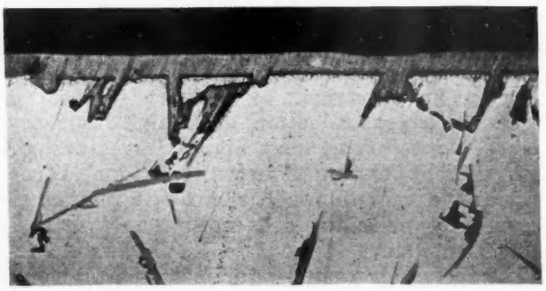
COMMERCIAL electroplating of aluminum and its alloys is now a well-established process. Nearly ten million electroplated aluminum hub caps are in use at the present time. Plated-aluminum running board moldings, deck-lift handles, windshield bases, and caps for radiators and gasoline tanks are seen from coast to coast. How different the situation seven years ago when, after repeated efforts to satisfactorily plate aluminum had failed, experienced electroplaters threw up their hands in despair and said "It can't be done!"

Earlier platers had tried to apply the same methods to aluminum that they had used for steel and other metals. Almost invariably the aluminum-plated surface had blistered and peeled. Assuming that the trouble lay in the heavy coating of oxide on the aluminum, and also the inadequacy of surface preparation methods in common use at that time, Dr. Harold K. Work of the Aluminum Co. and his associates, discarding all the old formulae, succeeded in working out a special technique for electroplating aluminum—a distinct departure from any of the techniques used for other metals. The method was successful, and electroplating of aluminum became a commercial reality.

The general procedure laid down by Dr. Work is this: The metal is first cleaned of any dirt or grease with a mild alkaline cleaner or solvent, and then rinsed in clear, cold water. The surface is then made uniformly active by a dip of from 5 to 30 seconds in a solution of 1 part of 50 per cent hydrofluoric acid with nine parts of water. In case an acid dip is to follow, this preliminary dip is eliminated. The surface is next roughened by etching, rinsed in clear, cold water, then transferred to the plating bath. The procedure







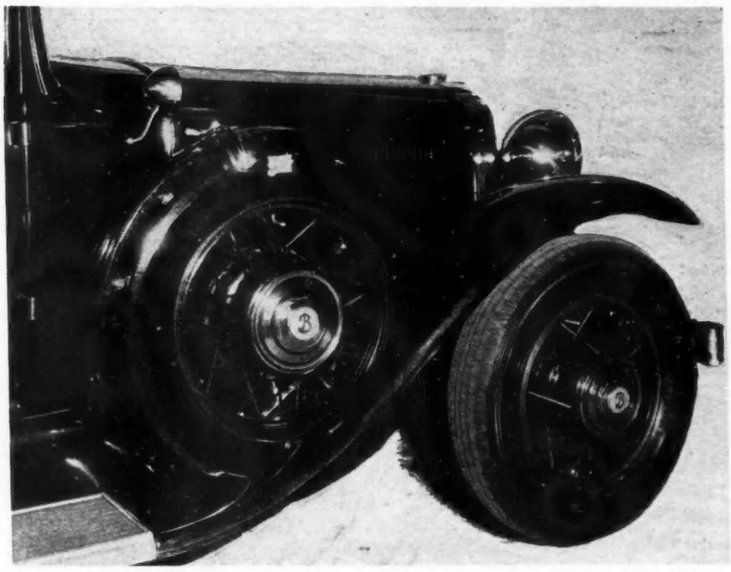
Photomicrographs showing various types of electroplated deposits on aluminum

(a) (Top left) Chrome plating over nickel base on commercially pure aluminum. Note the size and shape of pits with the relatively smooth areas between. These undercut pits anchor the deposit to the aluminum.

(b) (Lower left) Nickel deposit on die casting alloy (2 per cent copper, 3 per cent silicon). The nickel deposit follows the network structure.

(c) (Below) Nickel deposit on sand casting alloy (5 per cent silicon). Note how the etching solution has removed silicon plates to make anchoring pits for the nickel deposit.

Basis Practicable With Process Control



Chromium-plated aluminum hub caps are extensively used on our modern automobiles

from this point follows the general procedure employed for other metals.

The degree of success attained in an electroplated aluminum job depends on two factors: first, the surface of the metal must be properly cleaned prior to the etching; second, and even more important, the etching must be deep enough to provide adequate anchorage for the plating.

The cleaning process accomplishes a dual purpose. It removes all dirt and grease from the surface and also helps to dissolve a greater portion of the oxide film which covers the aluminum. With ordinary metals it is customary to use strong alkaline cleaners to dissolve the dirt and grease. These are often too strong for use with aluminum, as they have a tendency to attack the metal. In place of these a mild alkaline cleaner is recommended, containing small amounts of sodium carbonate and tri-sodium phosphate in equal quantities of 1 to 3 ounces to a gallon of water, applied hot at 180 deg. to 200 deg. Fahr. Such a mixture attacks the aluminum mildly in about the same manner as an "electric" cleaning.

This alkaline cleaner is usually followed up with an acid dip which not only removes all traces of the alkaline cleaner but also assists in the removal of the oxide film. Of course, it is impractical to remove completely this film of oxide from the aluminum, because of properties inherent in the metal itself. However, the acid dip removes enough of it so that its presence is rendered unobjectionable.

The second major consideration is that of properly roughening the surface of the metal prior to plating. It is not sufficient, with aluminum, to produce merely an irregular surface such as is obtained, for example, by sand blasting. Rather, it is necessary to produce by use of special etching reagents, deep undercuts in the surface of the aluminum to which the plating metal may anchor itself. The selection of the proper etching solution depends upon the amount of alloying constituents that have been added to the aluminum. Where commercially pure aluminum is plated a "high-metal-dip" (See Table 1) is selected and a 15 to 30 second immersion is usually sufficient. If the alloying additions total between 0.0 and 6.5 per cent the "low-metal-dip" is selected with an immersion varying between 10 and 60 seconds, depending on conditions. Where the alloying con-

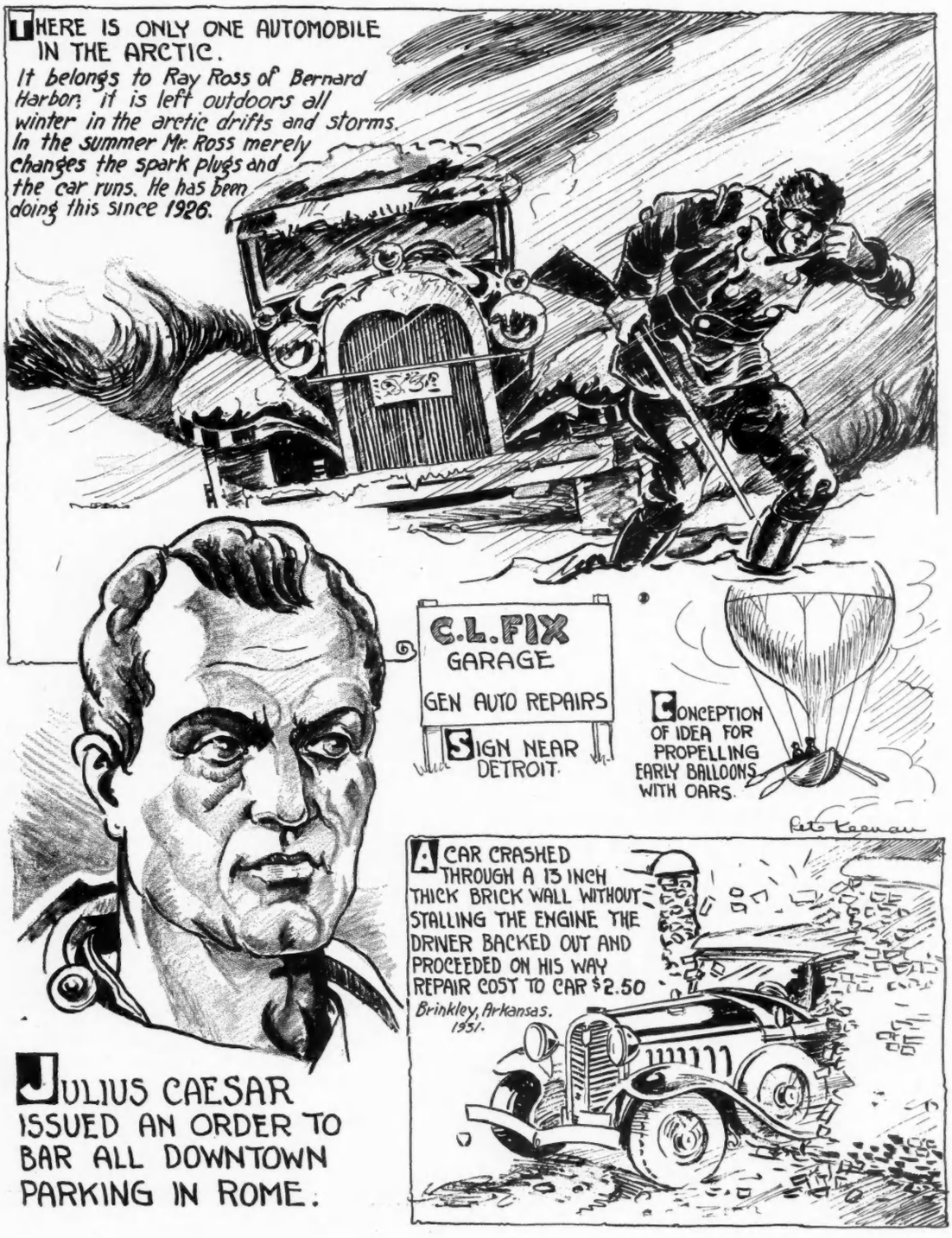
(Turn to page 110, please)

TABLE 1—Composition of Typical Etching Solutions

Designation of Dip	Composition		
	Water	Hydrochloric Acid (Specific Gravity 1.18)	Metal Salt
High-metal-dip Nickel dip	1 gallon	0.2 gallon	$NiCl_2 \cdot 6H_2O$ 36 ounces
Low-metal-dip Manganese dip[1]	0.66 gallon	0.33 gallon	0.5 ounce
Acid dip		Hydrofluoric acid (50 per cent), 1 part Nitric acid (specific gravity 1.42), 3 parts	

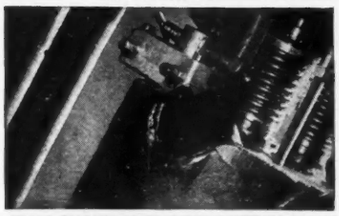
[1]Ann. Chem. Anal. ,2335 (1920).

Automotive Oddities—By Pete Keenan



Do You Know An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY

Mellon Presents His Tax Program

Appears Before House Committee on Ways and Means

WASHINGTON, Jan. 14—Recommendation for excise taxes on automobiles, motor trucks and accessories was formally made before the House Committee on Ways and Means yesterday by Secretary of the Treasury Andrew W. Mellon. Secretary Mellon was the first witness heard on the tax programs. Hearings are scheduled to last through Jan. 23, the day on which automotive interests will present opposition to the proposed excise taxes.

The taxes proposed for automobiles, trucks and accessories are those which were carried in the 1924 revenue act. The sales taxes proposed on automobiles, trucks and accessories are 5, 3 and 2½ per cent, respectively. The secretary estimated that the additional revenue arising from these taxes for the fiscal year 1932 is $40,000,000, assuming the taxes become effective Jan. 1, 1932. For the fiscal year 1933 the estimated increased revenue from motor sales taxes is $121,000,000. The estimated increase of $40,000,000 for the first half of the current year is made up of $27,000,000 for passenger automobiles, $3,000,000 for trucks and $10,000,000 for accessories. The increase estimated for the fiscal year 1933 is made on the basis of $90,000,000 for automobile sales, $7,000,000 for truck sales and $24,000,000 for sales of accessories.

In urging these and other taxes, largely a reenactment of the 1924 revenue act, Secretary Mellon said:

"I realize, of course, that arguments can be advanced against every increase in rate or additional tax proposed. This is true of all measures looking to an increase in the public revenue. But I trust that on this occasion the attitude of taxpayers

(Turn to page 102, please)

THE maimed, the halt, and the blind were all present at the New York National Automobile Show. We even saw babies-in-arms, one certainly not more than three weeks old. Perhaps the 59 or more radio broadcasts planned in connection with the show, and already functioning on Saturday, had something to do with packing them in that way. The newspapers had the Big Town plastered (with posters) and every restaurant menu had its little red sticker, "Welcome to the National Automobile Show."

Had the more or less annual experience of walking into one of the exhibits and asking for the vice-president of a company, to be met with the query "who's he? Does he work in our Broadway store?" My, my. The boys should be required to do more homework on the Chilton Factory List. (Adv't.)

Marmon picked out a nice hotel in which to exhibit a convertible cabriolet, brought the car down from the Bridgeport distributors and then found no door in the hotel was wide enough to get the car through. What they should have brought down was one of those collapsible cabriolets.

Arrivals from Europe for the show included: R. K. Evans, director general of the Opel Motor Works; A. Hoffmann Trobeck, Bugatti; A. Bonal, Peugeot; Sir William (Billy to John Willys) Letts, chairman of Willys-Overland Crossley; and J. C. J. Phillips, who runs the English automobile show, and is therefore the S. M. of the U. K.

Packard held a dealer meeting in San Francisco simultaneously with that held in New York at which the 1932 program was revealed to the Western distributing organization. The Frisco meeting was featured by an address by President Macauley who talked by long distance telephone from New York. The Frisco meeting was conducted by J. W. Loranger, general sales manager, and F. H. McKinney.

THE NEWS TRAILER

Price announcements on cars exhibited at the New York Show will be found on page 102 of this issue.

December Production Estimated at 120,107

N.A.C.C. Figure Indicates 71 Per Cent Increase

NEW YORK, Jan. 12—Production of motor vehicles in the United States and Canada for the month of December just past is estimated at 120,107 units by the National Automobile Chamber of Commerce. This figure is 71 per cent greater than production for November, but 26 per cent below production for December, 1930. In making these figures public Chamber officials pointed out that the November-December seasonal increase in 1930 was only 13 per cent, as contrasted with the 71 per cent for 1931.

Production of motor vehicles for the whole year of 1931 is estimated to have reached 2,468,493 units, which is 30 per cent below production for 1930 and 44 per cent below the five-year average figure. Actual production in 1930 reached 3,510,178 units.

Contest Board Elected

NEW YORK, Jan. 12—At the annual meeting of the contest board of the American Automobile Association yesterday, the following were elected members of the contest board: Col. E. V. Rickenbacker, David Beecroft, T. E. Myers, Ray T. Sherman, W. D. (Eddie) Edenburn, Robert B. Gable, A. C. Pillsbury, George Fearsons, E. Waldo Stein, Col. William H. Wall, Norman G. Shidle, directing editor, Chilton Class Journal Co., B. E. Sibley, E. Von Hambach, A. C. Faeh, Joseph E. Dawson and Barney Oldfield.

Honors for Reeves and Pyke Johnson

NEW YORK, Jan. 12—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and Pyke Johnson, the Chamber's Washington

(Turn to page 103, please)

Steel Mills Wait Post-Show Rush

Light Orders Carry Demands for Quick Delivery; Price Steady

NEW YORK, Jan. 14—Decrease by 198,538 tons in the leading interest's backlog at the turn of the year from its unfilled obligations at the end of November, revealed by the latest unfilled tonnage statement, indicates a great deal of demand overhanging the steel market at this time. It was the first time since 1922 that the December backlog failed to show an increase over the preceding month.

According to reports from the Cleveland district, sufficient automotive business has trickled through to enable the mills to operate at about 32 per cent of capacity. Youngstown and Pittsburgh district operations continue on a virtually unchanged basis. A rather unpleasant feature of prevailing buying methods is that, light as the tonnages involved in individual orders are, they are nearly all accompanied by requests for immediate shipment, making the orderly scheduling of rolling specifications and routing of the material through the mills extremely difficult. This state of affairs further corroborates impression that when, following the show period, buying gains momentum, a rush will develop not so much in point of tonnage as in that every buyer will want to have his steel just a little bit quicker than anybody else. The price situation continues along unchanged lines.

Pig Iron—More buying by automotive foundries is noted. General Motors is reported to have placed with three lake blast furnace interests orders aggregating 100,000 tons of malleable and foundry, to be specified against later. The price is to be based on the average market quotation at the time of shipment.

Aluminum—The European aluminum cartel is reported to have lowered its price to the equivalent of about 17.35c per pound which plus the 4c duty and 1c for c.i.f. and delivery would bring the cost of imported metal here to approximately 22.35c. The prevailing quotation in the American market is 22.90c.

Copper—The market strengthened perceptibly on reports of the ratification of revised rules by Copper Exporters, Inc., and fairly good export buying. Domestic demand continues rather light. The market is quotable at 7½c, delivered Connecticut Valley.

Tin—Amid little consuming interest Straits tin was quoted at 21¾ @ 22c at the opening of the week.

Lead—Demand is slightly broader. Price unchanged.

Zinc—The market is off fractionally, prompt shipment metal being quoted at 3.05c, East St. Louis.

Lincoln Schedules Up

DETROIT, Jan. 12—Employment at Lincoln Motor Co. last week-end reached a total of 3600, the largest enrolment since 1928, according to a factory announcement. The plant is working a full five-day week, the January schedule caling for production and shipment of approximately 1000 of the new 8-cyl. and 12-cyl. Lincoln cars.

Price Announcements

AUBURN

8-100 Standard Models, 127-inch wheelbase

Coupe	$ 845
Brougham	895
Sedan	945
Cabriolet	995
Speedster	1,095
Phaeton	1,095
7-Pass. sedan	1,145

(136-inch wheelbase)

Extra equipment included in above prices: One extra tire (5:50) and tube; bumpers—front and rear; four two-way Hydraulic shock absorbers. (7-pass. sedan carries 6:60 white sidewall tire and tube.) Free wheeling on all models.

8-100-A Custom models—with Dual Ratio 127-inch wheelbase

Coupe	$1,045
Brougham	1,095
Sedan	1,145
Cabriolet	1,195
Speedster	1,295
Phaeton	1,295
7-Pass. sedan	1,345

(136-inch wheelbase)

Extra equipment included in above prices includes all those shown under 8-100 Standard, etc.

12-160 Standard Models, 133-in. wheelbase

Coupe	$1,345
Brougham	1,395
Sedan	1,445
Cabriolet	1,495
Speedster	1,595
Phaeton	1,595

Extra equipment included in above prices: One extra 6-ply tire (6:00) and tube; bumpers—front and rear; four two-way Houdaille shock absorbers; Startix and free wheeling included on all models.

12-160-A custom models—with Dual-Ratio 133-inch wheelbase

Coupe	$1,545
Brougham	1,595
Sedan	1,645
Cabriolet	1,695
Speedster	1,795
Phaeton	1,795

Extra equipment included in above prices includes all those shown under 12-160 Standard, etc.

Franklin Prices Set

NEW YORK, Jan. 12—The following price changes were announced by the H. H. Franklin Mfg. Co. at the National Automobile Show in New York:

FRANKLIN

	New Price	Old Price
Sedan (5-pass.)	$2,250	$2,395
Oxford sedan	2,300	2,445
Convertible coupe	2,295	....
Vic. brougham	2,350	2,495
Sedan (7-pass.)	2,450	2,595
Limousine	2,600	2,695
Coupe	2,250	2,345
Club sedan	2,300	2,445
Speedster	2,450	2,545

The new 12-cylinder line will start at $3,200, the various prices for body styles not yet having been determined.

CHRYSLER

Standard Eight

Conv't. sedan (added)	$1,695

Standard Imperial

Conv't sedan	$2,195

Custom Imperial

Close couple sedan	$2,895
Sedan 7-pass.	2,995
Sedan lim.	3,295
Conv't roadster	3,295
Phaeton	3,395
Conv't sedan	3,595

Pierce Prices Announced

NEW YORK, Jan. 13—The following prices were announced for Pierce-Arrow 1932 lines at the New York automobile show:

54			
Coupe Rdster 2-4 pass.	$2,883	Tourer	$3,650
Tourer	2,983	Spt. Phaeton.	4,083
Spt. Phaeton.	3,283	Club Bro'm..	3,328
Club Bro'm..	2,528	Coupe	3,518
Sedan	2,718	Sedan	3,518
Coupe	2,718	Club Sedan .	3,683
Club Sedan .	2,883	Club Berline.	3,883
Club Berline.	3,083	Conv't Sedan.	3,983
Conv. Sedan.	3,183	Sedan	3,783
Touring	3,133	Enc. Dr. Lim.	3,983
Sedan	2,983	52	
Enc. Dr. Lim.	3,183	Sedan	4,028
53		Club Sedan .	4,133
Convt. Rdstr.	3,683	Club Berline .	4,333
Tourer	3,783	Sedan	4,318
		Enc. Dr. Lim.	4,533

Shidle, Denham Talk to Bridgeport Group

BRIDGEPORT, CONN., Jan. 8—Norman G. Shidle, directing editor of the Chilton Class Journal Co., and Athel F. Denham, field editor of *Automotive Industries*, told members of Engineers Club here about recent and future developments in automotive engineering.

Automatic transmissions and floating power type of engine mountings will probably halt the trend to multi-cylinder engines, according to the speakers.

Most of the engineering development for motor vehicles will come from parts plant development rather than from the engineering departments of car and truck factories, they predicted. "This year will be recorded in automotive history as an interlude between factory engineering and the parts company development of the future."

The phenomenon of fewer cars sold than scrapped means that 1932 will be a better automotive year than most statisticians believe, Mr. Shidle said.

Mellon Presents Program

(Continued from page 101)

will be different from that which, knowing human nature, we would expect under normal circumstances. We are in the midst of a grave emergency. It is essential to raise additional revenue, not just to cover current expenditures but to maintain unimpaired the credit of the United States government. This last objective is of paramount importance to every citizen in the land. It is an indispensable step in our progress toward recovery."

Packard Prices Touch $1,750

Range on New Twin Six Begins at $3,650

NEW YORK, Jan. 9—Prices on the new Packard light eight and twin-six models and reductions on the standard and de luxe eight series, were announced today simultaneously with the initial showing of the two new models at the National Automobile Show. The prices follow:

Light Eight

5-pass. sedan	$1,750
5-pass. coupe-sedan	1,795
2-4 pass. coupe-roadster	1,795
2-4 pass. coupe	1,795
Chassis	1,550

Twin Six—142 in. Wheelbase

7-pass. touring	$3,895
5-pass. phaeton	3,790
5-pass. sport phaeton	4,090
2-4 pass. coupe roadster	3,750
5-pass. conv. victoria	4,325
5-pass. conv. sedan	4,395
2-4 pass. coupe	3,650
5-pass. coupe	3,850
5-pass. club sedan	3,895
5-pass. sedan	3,745
Chassis	3,150

Twin Six—147 in. Wheelbase

7-pass. sedan	$3,995
7-pass. sedan-limousine	4,195
Chassis	3,450

Standard Eight

	New	Old
5-pass. sedan—130 in.	$2,250	$2,485
Chassis	1,950	....
7-pass. touring—137 in.	2,500	2,775
5-pass. conv. vict.—137 in.	3,195	3,395
5-pass. conv. sedan—137 in.	3,250	3,445
2-4 pass. coupe—137 in.	2,595	2,675
5-pass. coupe—137 in.	2,745	2,795
7-pass. sedan—137 in.	2,835	2,885
Chassis—137 in.	2,050	....

Prices on other standard-eight body models are unchanged.

De Luxe Eight

142 in. Wheelbase	New	Old
7-pass. touring	$3,395	$3,795
5-pass. phaeton	3,290	....
5-pass. sport phaeton	3,590	3,990
2-4 pass. coupe roadster	3,250	3,750
5-pass. conv. victoria	3,825	4,495
5-pass. conv. sedan	3,895	4,550
2-4 pass. coupe	3,150	3,725
5-pass. coupe	3,350	3,850
5-pass. club sedan	3,395	3,890
5-pass. sedan	3,245	3,845
Chassis	2,650	....

147 in. Wheelbase

7-pass. sedan	$3,495	$4,150
7-pass. sedan-limousine	3,695	4,285
Chassis	2,950	....

Shipments of the new light eight will begin about March 1, and of the twin-six about a month later. According to president Alvan Macauley, Packard does not intend to announce new models again until December of this year or early in January, 1933. Prices have been established so low on all four lines, according to Mr. Macauley, that only an anticipated increase in volume can justify them and any price changes are more likely to be upward than down.

Dealers and distributors have been informed that Packard had adopted the new standard warranty and owner service policy. Under the terms of the latter the owner receives three free inspections and adjustments during the warranty period from the dealer who sold him the car, but any Packard dealer will make good defects covered by the warranty. Packard will reimburse the dealer for half the labor cost of making warranty replacements.

Road Builders Show; MacDonald Gets Award

DETROIT, Jan. 14—Attendance at the American Road Builders' Show being held in the Detroit Municipal Airport reached 15,000 at the closing hour yesterday afternoon, which is 10 per cent ahead of the attendance last year. It is estimated that the total attendance for the show will approximate 25,000.

A feature of the opening sessions of the convention, accompanying the show, was the presentation of the George S. Bartlett award for "outstanding contribution to highway progress" to Thomas H. MacDonald, chief of the Bureau of Public Roads of the Department of Agriculture.

December Indices of the Six Color Families*

	1930	Index No.	1931	Index No.
1	Black	173	Blue	168
2	Green	125	Green	144
3	Blue	106	Black	128
4	Brown	82	Grey	59
5	Maroon	62	Maroon	45
6	Grey	24	Brown	40

* Reported by Duco Color Advisory Service.

Reeves and Johnson

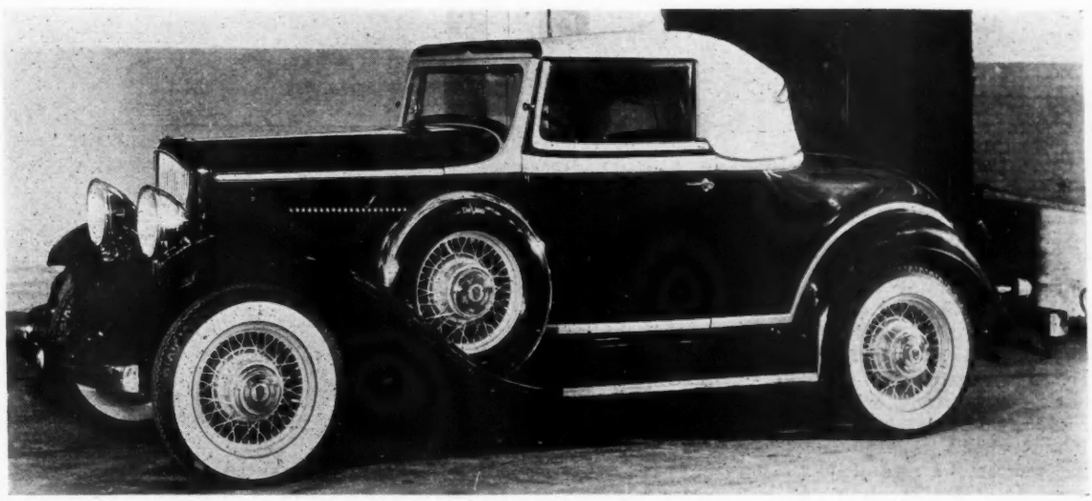
(Continued from page 101)

representative, were elected vice-presidents of the organization at the meeting of the board of directors held in New York this week. This is the first time in the history of the Chamber that executives not directly connected with motor vehicle producers have been honored in such a way.

Ford Orders Aluminum

ALCOA, TENN., Jan. 12—The Ford Motor Co. has placed an order for 500,000 lb. of sheet aluminum with the local plant of the American Aluminum Co.

DeVaux Adds New Model to Line



A convertible coupe has been added to the De Vaux line and was shown at the Commodore Hotel during New York Show Week

Nash Arrives at Show, Announcing McCarty's Elevation to President

Mr. and Mrs. Nash leave the train at New York

NEW YORK, Jan. 11—E. H. McCarty, formerly vice-president and general manager of Nash Motors, has been made president of the company, and Charles W. Nash has become chairman of the board. This news was brought to New York by Mr. Nash when he arrived for the National Automobile Show Saturday, Jan. 9. The announcement included the advancement of Robert B. Elliott, formerly production manager, to vice-president in charge of operations, and of H. E. Long, formerly purchasing agent, to vice-president and director of purchases. Messrs. Elliott and Long have been associated with Mr. Nash since the organization of his company in 1916.

March 1 will see an announcement of five new lines on five different wheelbases of cars by the Nash Motors Co., it was indicated. The company's plants are being completely overhauled at a cost of $2,000,000 in preparation for the new models. Most of this expense was written off in the 1930 report of the company, which covered the fiscal year ending Nov. 30.

At a directors' meeting held last week the regular dividend of 50 cents a share was declared. The financial statement presented at the meeting showed the 1931 operations of the company to be less satisfactory than those for 1930, but a total profit of $4,807,680 was shown for the fiscal year. This was at the rate of $1.76 per share on the 2,730,000 shares of common stock outstanding. During the fiscal year the company paid out in cash dividends $9,555,000. The balance sheet of the company shows cash and government securities to the value of $36,550,480. Inventory goods and securities were appraised at the lowest market price as of Nov. 30, it has been stated.

Earl H. McCarty, the new president of Nash, joined the organization in 1922 as general sales manager. In 1925 he was made a director of the company and in 1928 became vice-president and general manager. He has been identified with the transportation industry throughout his business career, beginning in a horse-drawn vehicle factory.

Austin Exhibits New Sedan

NEW YORK, Jan. 11—American Austin is exhibiting a new sedan at the New York automobile show. In this car wheelbase has been increased by 9 in. to 84 in. for materially increased body room. Price remains as formerly at $395. The sedan has been also made to conform with the modern trend and incorporates a number of features. There is no exterior visor and the roof header is rounded according to modern practice. Louver doors are used in place of conventional type louvers. There are two side cowl ventilators, two glove or package compartments in the instrument panel and an interior visor for the driver. Pockets are fitted to both doors. The rear wheel housings form arm rests for the rear seat. The frontal appearance has been changed by adding a vertical-vane false-front covering the core and upper and lower header tanks of the radiator.

Motor Wheel Output Up

DETROIT, Jan. 12—Motor Wheel Corp., Lansing, has stepped up production to a point where the factory is operating on a schedule which is 300 per cent more than at any time during the past six months, according to D. L. Porter, treasurer, due to the increased demand for Centrifuse brake drums.

Earl H. McCarty is the new president of Nash Motors

General Motors' Sales to Consumers in United States, 1928-1931, by Months

	1931	1930	1929	1928
January	61,566	74,167	73,989	80,582
February	68,976	88,742	110,148	107,014
March	101,339	123,781	166,942	155,973
April	135,663	142,004	173,201	170,544
May	122,717	131,817	169,034	186,892
June	103,303	97,318	154,437	174,085
July	85,054	80,147	147,079	142,515
August	69,876	86,426	151,722	151,105
September	51,740	75,805	124,723	118,113
October	49,042	57,757	114,408	109,789
November	34,673	41,757	68,893	70,414
December	53,588	57,989	44,216	25,435
Total	937,537	1,057,710	1,498,792	1,492,461

Sales to Dealers in United States

	1931	1930	1929	1928
January	76,681	94,458	95,441	96,845
February	80,373	110,904	141,222	141,642
March	98,943	118,081	176,510	168,107
April	132,629	132,365	176,634	161,720
May	136,778	136,169	175,873	170,388
June	100,270	87,595	163,704	154,912
July	78,723	70,716	157,111	135,412
August	62,667	76,140	147,351	149,781
September	47,895	69,901	127,220	136,870
October	21,305	22,924	98,559	91,428
November	23,716	48,155	39,745	27,672
December	68,650	68,252	36,482	27,779
Total	928,630	1,035,660	1,535,852	1,462,556

Total Sales to Dealers in United States and Canada Plus Overseas Shipments

	1931	1930	1929	1928
January	89,349	106,509	127,580	125,181
February	96,003	126,196	175,148	169,232
March	119,195	135,930	220,391	197,821
April	154,252	150,661	227,718	197,597
May	153,730	147,483	220,277	207,325
June	111,668	97,440	200,754	186,160
July	87,449	79,976	189,428	169,473
August	70,078	85,610	168,185	186,653
September	58,122	78,792	146,483	167,460
October	25,975	28,253	122,104	120,876
November	29,359	57,257	60,977	47,587
December	79,529	80,008	40,222	35,441
Total	1,074,709	1,174,115	1,899,267	1,810,806

United sales of Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, LaSalle and Cadillac passenger and commercial cars are included in the above figures.

Triphagen Rejoins Reo

C. A. Triphagen has been appointed supervisor of agencies of Reo Motor Car Co., according to an announcement by E. G. Poxson, general sales manager. Mr. Triphagen was previously associated with Reo for many years, but retired from the organization three years ago.

His resignation as general sales manager of Durant Motor Co. was announced in these columns Nov. 28.

Rubber Association Elects

NEW YORK, Jan. 12—The Rubber Manufacturers' Association, Inc., at its annual meeting yesterday re-elected the present board of directors and the same group of officers as served last year.

Following the meeting, the association held a banquet at the Waldorf-Astoria, at which J. D. Tew, president of B. F. Goodrich Co., and president of the association, presided. Mr. Tew indicated his belief that this year will witness a marked increase in the price of raw rubber, which should benefit the industry to a great extent.

The speakers at the banquet were the Hon. L. J. Dickinson, United States Senator from Iowa, and John B. Kennedy, associate editor of Collier's Weekly.

Tire Casing Shipments

NEW YORK, Jan. 12—Tire casing shipments during November were 2,887,464, according to the Rubber Manufacturers' Association. This represents an increase of 1.3 per cent over October, and 1.9 per cent above November, 1930. This compares with a usual decline of 26.3 per cent.

Production during the month is placed at 2,500,788 units, a drop of 15.9 per cent under October and 5.8 per cent under November, 1930.

Inventories as of Nov. 30 were 7,919,034, a decrease of 4.6 per cent under October, and 17.5 per cent below November of last year.

General Motors Sales Reported

1931 Summary Covers Releases to Dealers and Public

NEW YORK, Jan. 10—General Motors dealers in the United States sold 937,537 units to consumers during 1931, as against 1,057,710 during the previous year. Sales to consumers during December were 53,588 units, as against 34,673 in November and 57,989 in December of the previous year.

Sales by divisions to dealers during the year were 928,630, as compared with 1,035,660 during 1930. Sales made during December totaled 68,650, as compared with 23,716 during November and with 68,252 in December of the previous year. Sales to dealers throughout the world were 1,074,709 for the year, as compared with 1,174,115 for 1930. December sales to world dealers were 79,529, as compared with 29,359 for November and 80,008 in December of 1930.

Oakland Personnel Shifts

Oakland Motor Car Co., has appointed T. W. Moss as service manager, succeeding J. S. O'Rourke. D. U. Bathrick, former Eastern sales manager, has been transferred to the Western salesmanagership, and R. K. White has been appointed Eastern sales manager.

Assign Tax Hearing Date

WASHINGTON, Jan. 14—The House Committee on Ways and Means has assigned Saturday, Jan. 23, as the date for hearing protests from automotive interests against sales taxes. So far five witnesses have entered their appearances. They are George M. Graham (or Roy D. Chapin), National Automobile Chamber of Commerce; Harvey L. Cobb, general counsel, American Motorists Association, Washington; Thomas P. Henry, president, American Automobile Association; Walter B. Guy, Washington, attorney, National Automobile Dealers Association; A. L. Viles, New York, Rubber Association of America.

In addition to the above list of formal witnesses, all the directors of the National Automobile Chamber of Commerce have signified their intention of being present at the hearings.

E. A. Purchases Best

NEW YORK, Jan. 12—E. A. Laboratories, Brooklyn, has just purchased the Best Die Casting Corp., formerly located in New York, and a complete line of mirrors, fender guides, radiator caps, etc., are now being manufactured by the purchasing company.

Grant Sets 1932 Sales at 2,000,000

General Motors Official Pleads for Education of Buyers to Higher Levels

NEW YORK, Jan. 9—The past year or two has witnessed too much of a gravitation toward the low-priced field in purchases of cars on the part of those who could just as well afford higher quality merchandise, R. H. Grant, vice-president of General Motors Corp., told some 1400 dealers and salesmen at the second annual preshow dinner held at the Hotel Commodore last evening under the auspices of the Automobile Merchants' Association of New York. This new year should see concentrated effort on the part of those selling higher-priced cars to bring purchasers up to the level of their ability to buy and their desire for greater expression of individual taste. He pointed out that while dining room chairs could be bought for $1.50 apiece, most people paid considerably more for their household furniture than that, and they should be shown that there are similar differences in cars.

Analyzing the outlook for 1932, Mr. Grant expressed confidence that within three months a certain amount of the fog that now prevails with regard to our international outlook, and the future program of our government should be cleared away, and that whatever this clearing showed, it should result in the removal of the uncertainty that now exists and acts as a deterrent to sales. While not painting a rosy picture of the immediate future, Mr. Grant indicated his belief that there would be 2,000,000 passenger cars sold this year in the United States, which would exceed last year's sales by about 100,000, and pointed out his reasons for this belief.

Among the guests of honor at this dinner were: Ray A. Graham, vice-president of Graham-Paige Motors Corp.; John J. Schumann, Jr., president of General Motors Acceptance Corp.; John C. Boyers, president of Ward Motor Vehicle Co.; R. P. Page, president of the Autocar Co.; John C. Chick, sales manager of Cadillac Motor Co.; H. W. Peters, vice-president in charge of distribution of Packard Motor Co.; Paul G. Hoffman, president Studebaker Sales Corp. of America; Byron C. Foy, president of De Soto Motor Corp.; Walter P. Chrysler, chairman of the board and president of Chrysler Corp.; Alfred Reeves, vice-president of the National Automobile Chamber of Commerce; Alvan Macauley, president of Packard Motor Car Co. and of the N.A.C.C.; E. L. Cord, president of Auburn Automobile Co.; E. S. Gorrell, president of the Stutz Motor Car Co.; J. E. Fields, president of Chrysler Sales Corp.; Alfred H. Swayne, vice-president of General Motors Corp.; C. H. Bliss, vice-president of Nash Motors Co.; W. R. Tracy, general sales manager, Hudson Motor Car Co., and George M. Graham, vice-president of Rockne Motors Corp. William L. Colt, president of Dodge Motors New York, Inc., and president of the Automobile Merchants Association of New York, presided.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

National Automobile, New York	**Jan. 9-16**
San Francisco, Automobile	Jan. 9-16
Lansing, Mich., Automobile	Jan. 11-16
Flint, Mich., Automobile	Jan. 13-16
Newark, N. J., Automobile	Jan. 16-23
Omaha, Neb., Automobile	Jan. 16-23
Toledo, Ohio, Automobile	Jan. 16-22
Cincinnati, Automobile	**Jan. 17-23**
Milwaukee, Wis., Automobile	Jan. 17-23
Philadelphia, Automobile	**Jan. 18-23**
Louisville, Ky., Automobile	Jan. 18-23
Columbus, Ohio, Automobile	Jan. 23-28
Boston, Mass., Automobile	Jan. 23-30
Minneapolis, Minn., Automobile	Jan. 23-30
Hartford, Conn., Automobile	Jan. 23-30
Detroit, Automobile	**Jan. 23-30**
Montreal, Automobile	Jan. 23-30
Baltimore, Automobile	**Jan. 23-30**
Pittsburgh, Pa., Automobile	Jan. 23-30
Portland, Ore., Automobile	Jan. 23-30
Springfield, Mass., Automobile	Jan. 25-30
Harrisburg, Pa., Automobile	Jan. 25-30
Seattle, Wash., Automobile	Jan. 25-30
St. Petersburg, Fla., Automobile	Jan. 27-29
National Automobile, Chicago	**Jan. 30-Feb. 6**
Salon, Chicago	**Jan. 30-Feb. 6**
Washington, D. C., Automobile	**Jan. 30-Feb. 6**
Cleveland, Automobile	**Jan. 30-Feb. 6**
Springfield, Ill., Automobile	Feb. 4-6
Plainfield, N. J., Automobile	Feb. 6-13
St. Paul, Minn., Automobile	Feb. 6-13
St. Louis, Automobile	Feb. 7-13
Denver, Colo., Automobile	Feb. 8-13
Indianapolis, Ind., Automobile	Feb. 13-19
Salon, Los Angeles, Calif.	Feb. 13-20
Kansas City, Automobile	Feb. 13-20
Mankato, Minn., Automobile	Feb. 17-20
Peoria, Ill., Automobile	Feb. 17-21
Holyoke, Mass., Automobile	Feb. 18-22
Des Moines, Iowa, Automobile	Feb. 21-26
Wichita, Kan., Tractor and Power Equipment	Feb. 23-26
Salon, San Francisco, Calif.	Feb. 27-Mar. 5
Albany, N. Y., Automobile	Feb. 27-Mar. 5
Berne, Switzerland, Automobile	Mar. 11-20
National Aircraft, Detroit, Mich.	Apr. 2-10

FOREIGN SHOWS

Copenhagen, Automobile	Feb. 26-Mar. 6
Lyons, France, Passenger and Commercial	Mar. 7-20
Geneva, Switzerland, Passenger and Commercial	Mar. 11-20
Vienna, Passenger and Commercial	Mar. 13-20
Tel Aviv, Palestine (Levant Fair)	April 7-30
Milan, International Automobile Salon	April 12-27
Zagreb, Jugoslavia, Automobile Salon	April 23-May 2
Peznan, Poland, International Fair	May 1- 8
Dublin, Commercial	May 4- 7
Budapest, International Fair	May 7-16
Belfast, Commercial	May 25-28
Bordeaux, Fair	June
Cork, Commercial	June
Inverness, Commercial	June 21-24
Southampton, Commercial	July 5- 9
Llandrindod, Wales, Commercial	July 20-22
London, Olympia Show	Oct. 13-22
Glasgow, Scottish Motor Show	Nov. 11-19

CONVENTIONS

S.A.E. Annual Meeting, Detroit, Mich.	**Jan. 25-29**
Nat. Assoc. of Engine and Boat Mfrs., New York City.	Jan. 29

Harvey Firestone, Sr. Takes the Chair

John W. Thomas Heads Akron Organization as President

AKRON, Jan. 12—Harvey S. Firestone, Sr., resigned today from the presidency of the Firestone Tire & Rubber Co. of Ohio and California to become chairman of the board of the company. The resignation was accepted by the board of directors meeting in Akron Tuesday, and John W. Thomas, vice-president of the Firestone company for the last 13 years, was elevated to the presidency of the Ohio company. Ross J. Cope, vice-president of Firestone of California, was made president of the Western division.

Mr. Firestone, who founded the tire company bearing his name in 1900 and has been active head of the organization since, announced he was resigning from the presidency to get away from management details. Russell Firestone, second son of the Akron tire magnate, was made one of the directors of the company at the directors' meeting. The senior Mr. Firestone's announcement of his resignation from presidency of the company was first made at noon Tuesday before 3500 employee-stockholders and came as a surprise to the rubber world.

The change, Mr. Firestone said, would make it possible for him to give more effective direction to administration of all phases of the company affairs, including its subsidiaries in this country and other parts of the world.

The Firestone company now consists of two tire factories and a steel rim plant in Akron; tire plants in California, Hamilton, Ontario, Can., and Buenos Aires, Argentina. Cotton mills in Fall River, Mass., and Firestone plantations for crude rubber growing in Liberia, West Africa, are subsidiaries.

Chrysler Sees Relief

NEW YORK, Jan. 12—Expressing the belief that the atmosphere of economic depressions is now clearing, Walter P. Chrysler, chairman of the board and president of the Chrysler Corp., predicted sales during this year of between 2,000,000 and 2,200,000 passenger cars in the United States today at the usual show luncheon of Chrysler dealers held in the Hotel Commodore. With a line that now includes, for those who handle the Plymouth as well as those cars bearing the Chrysler name, cars in all price groups, Mr. Chrysler felt that sales of his products should exceed previous records. The incorporation of floating power into all Chrysler manufactured cars, gives these dealers something to be found in no other car in America, he said.

What Could Be Simpler— What More Practical?

In machining plain or curved surfaces, the question of how to control the action of the cutting tool is of vital importance from the standpoint of accuracy.

Positiveness of control is essential, because a cutting tool in order to operate efficiently and produce accurate work must be controlled by a positive movement, and deflection of cutter operating mechanism reduced to the minimum.

Massiveness of design is not sufficient assurance that the desired results will be obtained. There must be the correct correlation of parts. Furthermore, the mechanism should be simple in design and above all things practical.

What could be simpler and more practical than the cutter control mechanism on the Fellows Gear Shaper? It is direct, positive and comprises the minimum number of parts. No "beating around the bush" to get to the desired point—positiveness of control is doubly assured.

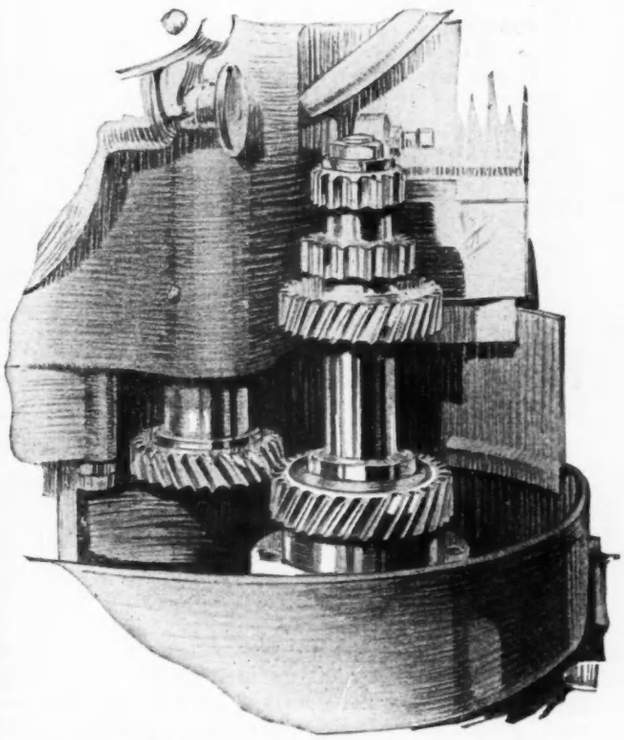
The guide, either straight or helical, is attached directly to the spindle carrying the cutter, and the shoe against which the guide acts is housed in the upper index-wheel which rotates the cutter. Changes in helix angle are not secured through a flexible adjustable mechanism, but by the use of positive guides made especially for that purpose and nothing else.

The same is true of Fellows Cutters used for generating helical or herringbone gears. No compromises are necessary—everything is under positive control.

The complete story is presented in booklet No. 7. Write for it.

THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont. (616 Fisher Building, Detroit, Michigan).

A positive guide control for every helix angle —An Original Fellows Helical Cutter designed especially for the exacting job it is to perform.

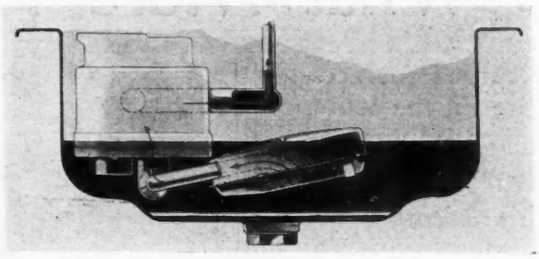


Helical Gears having helix angles up to and more than 45 degrees (depending upon pitch and diameter of cutter) can be accurately produced on the High Speed Gear Shaper.

FELLOWS
GEAR SHAPERS

Marmon Introduces New 8-125

(Continued from page 89)



The new Float-O device on the oil pump of the new Marmon 8-125. This enables the pump to draw clean oil at all times from the crankcase reservoir

force of brake application is equally divided between front and rear.

In the design of the body attractive side and front splashers have been provided which conceal the springs and shock absorbers. There is another shield at the rear of the car which conceals the gasoline tank. When a single spare tire is carried at the rear it is slanted forward.

Upholstering is in whipcord or mohair edged in leather. All hardware has bright chromium finish.

There are arm rests at the sides of the rear seat, and the front seat is fully adjustable fore and aft to suit the convenience of the driver. The steering column also is adjustable.

The Marmon 8-125 will be produced initially in three standard and three de luxe body styles—a five-passenger sedan, two-passenger coupe, and two-passenger convertible coupe. The coupes have rumble seats and the top of the convertible coupe folds down into the body.

Changes in and additions to the equipment of the Marmon Sixteen include new cowl lights mounted on the front fenders, chromium plating of the radiator shutters and a radiator ornament. The upholstery now is pleated and edged in leather, which is said to add to its durability. Arm rests have been redesigned for greater comfort, and at the top of each arm rest there is an ash receiver and vanity case. A sling-type grip sliding back and forth on a rail above each side of the rear seat has taken the place of the metal assist grip.

The Marmon Sixteen line will be continued with eight standard body styles, including a five-passenger sedan, five-passenger close-coupled sedan, seven-passenger sedan, limousine, five-passenger convertible sedan, two-passenger coupe, two-passenger convertible coupe, and five-passenger two-door coupe. In addition to these a wide variety of custom-built body styles are offered.

Franklin Gains 7 hp. by Supercharging

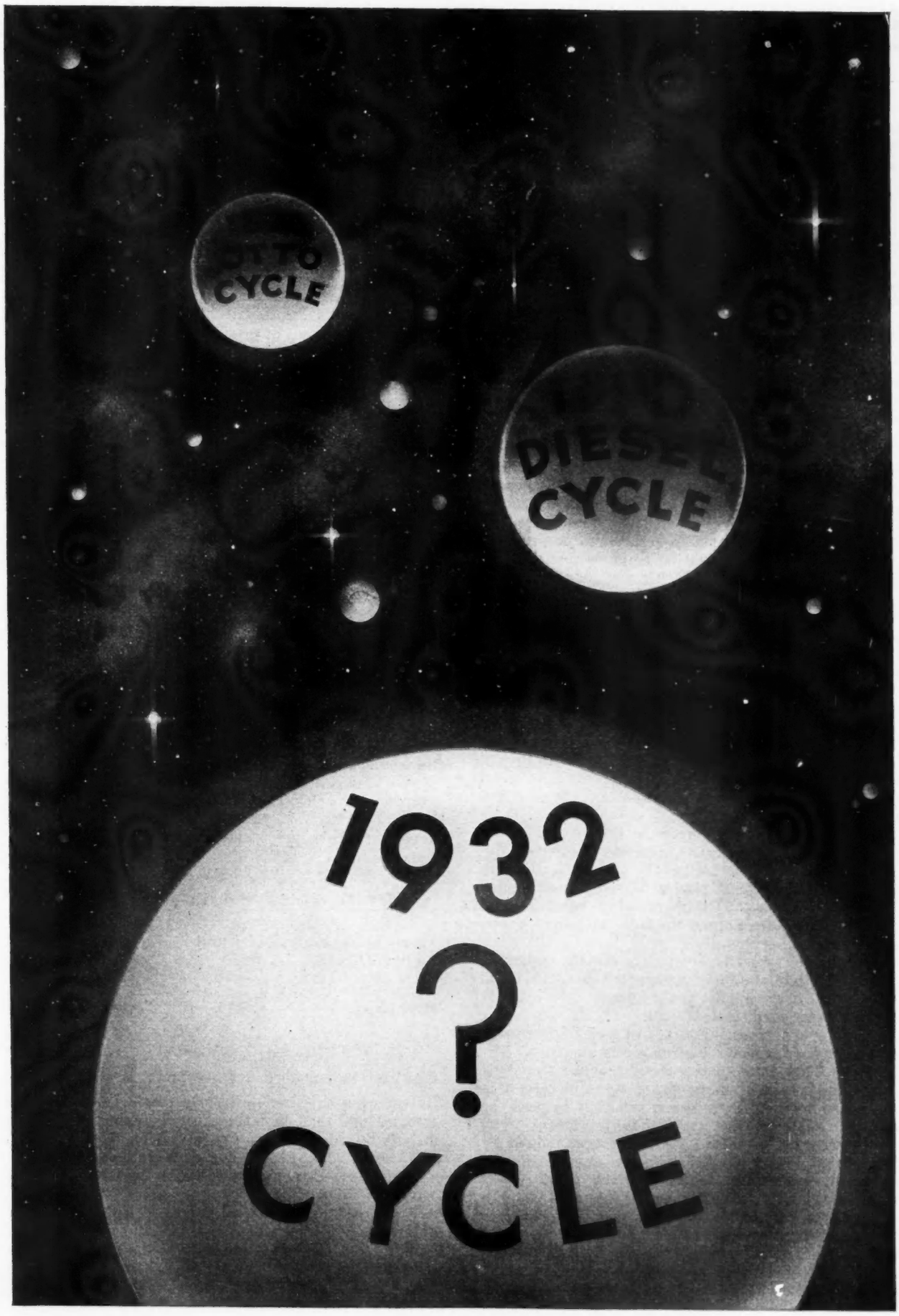
(Continued from page 87)

limousine, convertible coupe, and club sedan. Exterior features of the cars include a new V-type hood, a sloping windshield and gracefully curved rear quarters. The interiors also have been materially improved. Ash trays are included in the same unit with the wainscoting beneath the windows. Seat cushions have greater depth, improved padding, and a greater angle of tilt, and seat backs are higher. Padding is applied in the overstuffed style, without plaiting, and leather edgings are used. Bindings have been added to the mats, both around the outside edges and around the cut-outs. Bottoms of doors and cowl linings at the sides are protected against scuffing by carpet material.

A new design of sun visor is held in position by a friction device, and is adjustable. Door handles are of the remote-control type, which operate the latches and fasten the locks. Double-arm window regulators move the glass in metal-back channels. In the front doors these channels are supplemented by rubber rollers to maintain the alignment of the glass.

The body sills have been increased in thickness, for greater body rigidity. Great efforts have been made to obtain bodies that will remain silent permanently. All inside panels are sprayed with asphalt emulsion, which deadens sound. The dash is insulated by hair felt and covered by a molded piece of wood fiber. Sheets of Masonite to the bottoms of toe boards and floor boards, while thick mats of hair felt covered by enameled duck supplement the heavy wool carpet on top of the boards. The muffler is now mounted in rubber.

Bright chromium finish is now used for the bezels and controls on the instrument boards, replacing the former dull finish. A central panel with etched metal background carries the various engine controls, in addition to which there are on the board the controls for the free-wheeling unit and the ride regulator. The speedometer is of the new pointer type and has a 100 m.p.h. scale. Glove pockets are provided in the sides of the instrument board. Windshield frames on all models are now chromium-plated, to harmonize with the bright-metal trim at the front end. These bright-metal parts at the front of the car include double trumpet horns.


OTTO
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Electroplating Aluminum is Practicable

(Continued from page 99)

Chromium - plated aluminum windshield bases combine economy with excellent serviceability and attractive appearance

stituents total over 6.5 per cent, the "acid dip" is used, and the immersion time ranges between 10 and 20 seconds, depending on the structure of the alloy. In cases of borderlying cases it is advisable to make preliminary tests before plating.

Of course, the efficiency of the etch is influenced by the composition, temperature of the solution, time of etching and the condition of the metal. An etch which has proved satisfactory for a heat-treated alloy may be entirely out of place for use with an annealed or hard rolled alloy. Usually heat treated alloys require a longer immersion period to secure the proper etch.

In general, the actual plating of aluminum does not differ materially from the plating procedure employed on other metals. There are a few points, however, which must be remembered. Any nickel bath which operates successfully for zinc may be used on aluminum. The following table gives two nickel baths which may be employed.

In plating chromium on aluminum it is advisable to first apply a nickel plating at least 0.0005 inch thick, which makes possible the popular bright finish for which chromium is noted. Without this preliminary coat of nickel, a dull or lead color results which, though satisfactory for some jobs where appearance is not a prerequisite, is not generally advisable, as it does not take a high polish.

Many distinctive color effects in bronze and brown are obtained through the use of copper plating of aluminum in combination with the standard coloring treatment. Black nickel plating is sometimes applied with similar effects. Other striking variations in shade and finish are gained through the use of brass, cadmium and other metals.

Zinc "flashing" may be applied, in certain instances, over a smooth aluminum surface without the usual etching. Such an application is limited to interior jobs where dry conditions prevail.

A number of interesting tests are used to determine whether or not the electroplating job is a success. The adhesion of the plate to the metal may be tested by bending the specimen, or by breaking it in case it is too thick to bend. If there is any tendency to peel, the plate will usually show it under these conditions. The serviceability of the plated surface is best judged by the adhesion test combined with an accelerated corrosion test, such as a prolonged exposure to salt water spray, or a partial submersion of the sample plate in a solution containing sodium and calcium chlorides. These accelerated corrosion tests are quite severe, and any plate which shows no blistering or peeling after several days' exposure to such conditions will undoubtedly give excellent service under average conditions.

TABLE 2—Nickel-Pating Baths

	Ounces Per Gallon
Nickel bath 1:	
Nickel sulfate ($NiSO_4 \cdot 7H_2O$)	16
Sodium sulfate (Na_2SO_4)	26
Ammonium chloride (NH_4Cl)	2
Boric acid (H_3BO_3)	2
Nickel bath 2:	
Nickel sulfate ($NiSO_4 \cdot 7H_2O$)	19
Magnesium sulfate ($MgSO_4 \cdot 7H_2O$)	10
Ammonium chloride (NH_4Cl)	2
Boric acid (H_3BO_3)	2

Correction

In the final equation of William Samuels' article on "Trailer Frame Stresses Analyzed by New Method," appearing on page 840 of the Nov. 28 issue of *Automotive Industries*, the value "q" was variously given as "9" and "g"; the last 18 lines of the articles should have read:

"We also can add now to the expression for M_b the expression for M_1 (load only) and obtain the resulting bending moment M_3 for load and bump. For M_1 we have, if we take the variable x from the left end, the equation

$$M_1 = S_1 x - \frac{q}{2} x^2 - S_1 f \quad \ldots\ldots\ldots\ldots \quad (9)$$

where, in our example, the unit load $q = 100$ lb. per in. Adding M_1 to M_b, we find

$$M_3 = 2S_1 x - \frac{q + k\,\delta\,b}{2} x^2 + \frac{k\,\delta}{6} x^3 \quad 2S_1 f \quad \ldots\ldots \quad (10)$$

$$M_3 = 21{,}876\,x - 122.8\,x^2 + .117\,x^3 - 339{,}000$$

Substituting actual values, we find

By equating the first derivative of this expression to zero, we find that M_3 reaches a maximum for $x = 105$ in. At that distance we find a maximum value of $M'_3 = 739{,}000$ lb.-in. This value, as well as that of x (105 in.) is in very close agreement with the findings of the original article.

The stress at the critical point, S_3, is 739,000/30 or 24,600 lb. per sq. in., as in the original."

We regret this error, and suggest the correct expressions be clipped and filed with Mr. Samuels' article.—*Ed.*